

6-12 December 1984

It's the best selling weekly

Vol 3 No 49

Atari 800XL price slashed

ATARI has further slashed the price of the Atari 800XL (see *Popular Computing Weekly*, November 22)

The retail price is now down to £129 a reduction of almost 25% from its previous price of £169

The new price follows the announcement three weeks ago in the States that the 800XL would sell for just $120 (about £100) over there.

The aggressive price cutting of the 800XL — Atari's only home computer in the Christmas market now that the 600XL model has been dropped — reflects Atari boss Jack Tramiel's policy of "marketing for the masses"

"Manufacturing advances in high technology products mean that prices should be tumbling," commented Tramiel.

"Technology is what this decade is about. I've given this notion to my factories out in the Far East. They're going to produce it at the price the man next door can afford."

Atari factories worldwide are currently producing about ten million machines per year A large proportion of these are targeted for the European market for 1985 Atari has recently appointed a European marketing manager, M Rosi.

Further bargains for the Atari 800XL are available if you shop around. Laskey's, for instance, has an Atari Starter pack consisting of the computer, a joystick, data recorder, Introduction to Basic manual and one piece of software — which can be chosen from a selection — all for £170

Prestel breached

PRESTEL, the British Telecom database, has suffered a second serious breach of its security

On Sunday night a group of 'hackers' broke into Micronet only days after Prestel installed new security codes claimed to be unbreakable

The 'hackers' took action after Prestel removed its second biggest information provider — Timeframe — from the system. Timeframe was asked by Prestel to withdraw a claim

continued on page 5

Minter lights up

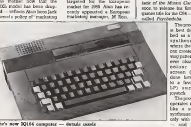
JEFF MINTER, author of Llamasoft Commodore classics including *Sheep in Space* and *Attack of the Mutant Camels* is soon to release his first non-games title for the C64 — to be called *Psychedelia*.

The program is best described as a light synthesiser, where the user can create moving patterns of ever changing colour on screen (best done listening to a favourite LP) using a joystick

The program operates much like a sound synthesiser — only with light — and it is



continued on page 5



Oric's new IQ164 computer — details inside

INSIDE) MIDI KEYBOARD) ADVENTURE COMPETITION)


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)View

If I was thinking of buying a micro this Christmas I would be looking pretty closely at the Atari 800XL.

Atari last week slashed its price once again so that it now costs only £129 — the same price as the 48K Spectrum.

Yet the Atari has 64K Ram and offers a number of features found only on more expensive machines — it has a better keyboard than the Spectrum Plus which costs £179. It has four sound channels, one more than the Commodore 64 which costs £199. The Spectrum models have only a one-voice squeak. The 800XL has a cartridge port and twin joystick ports, unlike the Spectrum models. It even has a monitor socket, sprite graphics and a display with up to 256 colours on screen at any one time.

In the words of Atari's latest ad the 800XL has now well and truly "socked the competition".

It's a big gamble. Before Jack Tramiel — Commodore's founder — split away and bought Atari in June the company had been losing $800m a year.

He has worked quickly. We now have a considerably slimmed down Atari that is proving to be very aggressive in the market. He has just borrowed a further $180m from his US investors push Atari back into the limelight. "Too many people have got too fat out of this business", he says.

The only problem with the Atari 800XL is software. The best programs are still unquestionably to be found on the Spectrum and Commodore 64 machines. Still, that should come if Tramiel's plan works.

The Atari 800X is now a very attractive purchase at £129. It makes Sinclair's Spectrum Plus — without either ZX Interface 1 or 2 built-in — look a bit mean and the Commodore 64 look very overpriced.

It makes the £278-plus MSX micros look like no-hopers.

POPULAR Computing WEEKLY
Vol 3 No 49

)Presents...

)Futures...

Which MSX? We spot the differences . . . And a machine-code taster of Jeff Minter's new *Psychedelia* to type in

Editor David Kelly **News editor** Christina Erskine **Features editor** Graham Taylor **Software editor** John Cook **Production editor** Lynne Constable **Editorial secretary** Geraldine Smyth **Advertisement manager** David Lake **Assistant advertisement manager** Alastair Macintosh **Advertisement executive** Tom Watson **Classified executive** Diane Davis **Advertising production** Lucinda Lee **Administration** Theresa Lacy **Managing editor** Duncan Scot **Publishing director** Jenny Ireland.

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How to submit articles Articles which are submitted for publication should not be more than 2000 words long. The articles and any accompanying programs should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted. **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work.

Computer Trade Association Magazine of the Year



SHARDS SOFTWARE PRESENTS ...
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GALILEE
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Galilee is an extensive text adventure with graphics. As the story unfolds you will become entangled in the drama that surrounded the early days of the Christian era
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Psychedelia

continued from page one

possible to produce pre-programmed sequencing, and pre-set shapes You can define the starting shape from which the program constructs his patterns and you can control the colour rotation sequence.

A number of built-in 'planes of symmetry' can be switched in or out to produce multiple images on-screen.

Further variation can be achieved by altering the bandwidth and the pulse length of the shape 'trail' which changes how the joystick effects the patterns Finally it is possible to record pattern sequences and then play them back.

"I enjoy writing games but I wanted to write something totally non-competitive but at the same time great fun to play and experiment with," explained Jeff Minter

Psychedelia is being released in mid-December for the Commodore 64 C16 (which has a 128-colour display) and Vic20 priced at £7 95

QL releases

IN THE same week as Psion's QL chess program is to be released Sinclair has announced a number of other new QL titles, which will become available before January

An assembler package has been produced by GST which will be priced at £39 95

QL Toolkit written by Tony Tebby and Sinclair adds 60 new commands to SuperBasic including full multi-tasking *QL Toolkit* will sell for £24 95

QL Cash Trader written by Accounting Software giving a dynamic profit/loss accounting system will sell for £39 95

Finally, *QL Linker* from GST is a relocating linker for programs written in compiled languages of M68000 assembler

CPC464 Forth

NEW hardware and software products have been announced for the Amstrad CPC464 by Skywave.

The company has produced an RS232 communications interface priced at £71 30, and also a Forth (Fig Forth standard) language package on cassette, priced at £20.70, for the machine.

Details from Skywave, 73 Curzon Road, Boscombe, Bournemouth.

New IQ164 details

THE new IQ164 Oric machine, due for launch in January on the continent (as the Stratos) and in the UK shortly afterward, will be priced around £250

The machine looks remarkably similar to the Atmos using the same keyboard and black and red colouring on the casing

The two cartridge slots on the upper left-hand side will offer a total of 112K Rom space for languages and applications programs The machine contains no internal Rom — Basic is provided on a plug-in cartridge

When Basic is used the function key can be used simultaneously with the other keys to give a single Basic keyword entry

The machine also offers a Centronics printer interface, two modem ports — one RS232, one V23, two Atari-style joystick ports, a cassette socket and both UHF and RGB/Pentel TV connections. It has a built-in disc controller and a Shugart 34-pin interface — giving the option to use 5inch discs as well as Orics 3inch Hitachi-based discs.

Spectrum+ hits snag

SINCLAIR's Spectrum+ computer has run into reliability problems and the number of faulty machines has resulted in a severe shortage of the micro in the shops.

"The shortage of Spectrum+ machines is having a devastating effect on the Christmas market," said John Flatman, of Boots computer buying department. "People are waiting until the machine finally arrives rather than buying an ordinary Spectrum, and it seems there are severe quality problems with the machine."

At W H Smith, a spokeswoman confirmed that the shops were not getting as many machines as they needed.

"We have been having problems with the keyboard in that many of the keys seem to be loose Consequently, we have been looking at them and testing them as they come out of the boxes.

"Recently the problems haven't been quite so bad as they were to begin with, and we are beginning to get replacements, though not enough."

"I am not aware that the situation is at all difficult at the moment," said Sinclair spokesman. "My impression is that things are a lot more positive this year than they were twelve months ago"

The Net spreads

MICRONET 800 is expanding abroad. A franchise to run Micronet has been given to the Hong Kong telephone company and Swedish PTT

The Swedish franchise will make Micronet available to users in Sweden, Norway and Denmark.

Micronet's managing director, Tim Schoonmaker, says that is just the beginning "Our next target is to take Micronet 800 to micro users in Australia and the United States."

Prestel

continued from page one

that Prestel's security had been broken and when they failed to comply Prestel removed them from the system.

Angry hackers then succeeded in breaking into Micromouse on Micronet leaving the message "Bring back Timeframe — hack of the century"

The same group is also apparently attempting to break into BT's prestige information service BT Gold.

Elite bugged

THE Electron version of *Elite*, Acornsoft's top selling game has run into problems.

A bug has been found that means Hyperdrive between galaxies is impossible in the cut-down Electron version, making the playing area an eighth the size of its BBC counterpart.

An Acornsoft spokesperson commented "the single galaxy restriction does not affect the actual playing of the game. It is still possible to achieve Elite status."

Acornsoft Managing Director, David Johnson-Davies explained further

"There is a bug in the program that means the game is played in one galaxy, but this does not affect the playing of the game — Elite status can still be attained.

"We regret the bug is present but, given the complexity of the game, it is difficult to guarantee the lack of bugs."

"However, if customers feel strongly about the matter, we will refund their money.

Acornsoft says that it is currently working to cure the problem and is looking at the possibility — if an eight-galaxy version can be produced — of replacing one-galaxy copies already sold with the corrected version.

Until it is known whether or not the problem can be solved, Acornsoft have no plans to alter the documentation supplied with the game, despite the fact that it clearly states that Hyperdrive is possible

Micronet

Following last week's *News Desk* item headed *QL network by Prism*, we would like to make clear that Prism no longer has any connection with Micronet which is run jointly by EMAP and British Telecom.



AIRWOLF is the latest game from Elite Systems based on the ITV series of the same name

The player must guide his helicopter through 12 playing screens to rescue, one by one, six kidnapped scientists.

The program will be available this month for the Spectrum priced at £6·95, and the Commodore 64 at £7 95

● Following the Elite launch, advertisements for a forthcoming Ocean game, also entitled *Airwolf* have been withdrawn.

Sir Clive goes on show

A WAXWORK model of Sir Clive Sinclair will be on show in Madame Tussauds from next April

Work on 'Sir Clive' himself has now been completed, but he will not be put on display until a model of Selina Scott is finished, as the two will appear in a tableau together

"Sir Clive will be shown holding one of the Sinclair pocket TVs,' explained a spokeswoman for Madame Tussauds 'Selina Scott will be looking over his shoulder, looking at the TV screen on which there will be a picture of herself."

Free bundles

TOSHIBA is currently offering three software packs bundled free with its new Toshiba HX 10 MSX computer

The three packs are CDS Micro Systems *French is Fun*, Ocean's *Hunchback* and *Manic Miner* from Bug Byte

"These three were chosen largely because we wanted chart-topping products, such as *Manic Miner*," said a Toshiba spokesman. "But we are keen to emphasise that MSX does not just mean games machines, so *French is Fun* was added to the list.

Learn to read ...

SINCLAIR has released a further 13 educational titles for the Spectrum and Spectrum+

Two — *Estimator Racer* and *Number Painter*—are ASK titles produced in association with Psion and priced at £4 95

The remaining 11 at £7 95 are Sinclair Macmillan programs. Four of these are science simulations written by Five Ways and five are additions to the Learn to Read series from Fisher Marriot

Tickets still to be claimed

A NUMBER of winning raffle tickets from the 14th ZX Microfair held on November 17 to 18 are still unclaimed.

The prize winning ticket numbers are as follows:

Green — 570, 842, 800 834 758 879 474 083 616 871 049 181 472, 309 736 697 180 308 188 817 347 303 582 808 864 478 382, 271 637 275 788 489 832 247 679 711 870, 349 303

Red — 720 306 308 454 448, 818, 518 468, 900 038 782 783 492, 461 478 413, 436, 803, 880 473 372, 889 413 808 411 524 808 438 811

White — 238 344, 201 140 305 884 488 383 888 330 802, 880 120 883 474 284, 88 110 148, 422, 200, 284, 148, 94 187 422.

Blue — 34, 111 78.

The raffle in aid of Capital Radio's 'Help a London Child raised over £700 for London children in need

The first prize was won by Mr M Slatford of S Croydon, Surrey

If your ticket number appears above write to ZX Raffle, 71 Park Lane, Tottenham, London N17 0HG, enclosing the ticket and a label with your name and address

Letters

QLUB tights back

In answer to the several points raised in R. Haugh's letter in the November 15 issue Sinclair Research should like to point out that:

1) The second *QLUB News* was distributed on November 12 and our records confirm that R Haugh was part of that mailing

2) The new-version Psion update will be offered free of charge to QLUB members as part of their membership entitlement We may subsequently offer these up-dated versions to non-QLUB members but there would be a charge

3) While R Haugh may feel that he does not need Psion software assistance, experience to date suggests that a large number of QLUB members do very much value that service — so far some 8 000 enquiries have been handled.

QLUB Editor
Sinclair Research
Cambridge

Ultimate news 1

I am writing this letter to put Mr N Brailsford who asked about Ultimate games on the 64, out of his misery Ultimate have already produced a version of *Jet Pac* on disc — although I must admit that my *Jet Pac* is a pirate copy of a pre-release version.

PS Ultimate have released a game called *The Staff of Karnath* for the 64

PS Sorry about the pirate version, Ultimate!

D Page
2 Park Approach
Welling
Kent

Ultimate news 2

I wish to stake my claim to be the first person to complete Ultimate's new Megagame/Movie/Classic program *Knight Lore* After two weeks of solid playing I stirred in the last charm and was cured. This historic event (!) took place on Friday the 23rd of November at 6 19pm for those who wish to challenge my claim. I won't say exactly what happens as it will spoil the aim of the game for other people Seeing as the cassette inlay is so vague, as are reviews, here are a few playing tips

1) You need two of each of the seven charms

2) You must drop them in the cauldron in the correct order

3) This is indicated by the cauldron steam.

4) You can't have three or more objects in a room.

5) You can drop and pick up, objects simultaneously

6) Keep track of what you have collected.

7) Make a map!

Andrew Wappat
15 Derngate
Longthorpe
Peterborough

Misleading review

Your *Book Ends* review of Adrian Dickens' *The QL Advanced User Guide* (*Popular Computing Weekly*, November 15) is extremely misleading in its references to the 'Sinclair QDOS manual'

This manual was in fact a preliminary draft of the QDOS documentation — a working piece of documentation which has never been published in any offical form. It has been supplied by Sinclair Research Limited *only* to software houses who have applied for it.

Anyone subsequently seeking permission to quote from the manual has been warned of possible errors, and permitted to proceed only and entirely at their own risk, on condition that Sinclair's copyright in the material is acknowledged

Sinclair expects to publish shortly its own comprehensive official Software Developers Guide

Software Department
Sinclair Research
Cambridge

"What do you suppose Jack Tramiel's trying to do?"

Imegine a micro

Even in the advanced digital microcomputer world we still have an electro-mechanical problem — the mass storage devices called disc drives.

A low-priced home micro costs around £150 — the disc drive which goes with it still costs up to £230 For the non-professional user a disk drive therefore seems rather expensive for what it does — storing and retrieving data — In comparison with the multitude of basic functions of the micro-keyboard, video-control, music, programming

To be complete a drive has also secondary functions the organisation of the data (*Copy, Delete Merge, Directory*) It is these functions which make the drive so expensive

Supposing it was possible to execute these secondary functions inside the computer without intervention of the mass storage device after the data is loaded.

I imagine a micro with 512K Ram and a fast tape or streamer as a mass storage device Loading and saving memory would only be possible in sequential blocks of a fixed length, say 192K Ram. This would make the tape operation very simple — a computer controlled start at the beginning and a stop at the end of the block. Without making the streamer too expensive it still must be possible to *Load* or *Save* a block in less than 15 second. Organising the data before saving would also be very easy it would only be a matter of changing the data locations in the memory Random accessing would no longer be a time consuming operation. With 512K Ram as memory it would be possible to have two of the memory blocks present in the computer for merging and copying files. Moreover the DOS could be replaced by a simple short menu driven program

It must be possible to build and sell a micro like this with a built-in fast tape unit for less than the cost of a micro plus disc drive — £400

Cormon Eddy
Hof Van Tichelen 26
B2030 Antwerp
Belgium

Is the QL the kind of machine you had in mind?

Dragon still fiery

I was very disappointed to read in last week's *Popular Computer Weekly* that you were surprised at the large turn-out at the 6809 show

The Dragon is alive, well and kicking like mad with a lot of support from a lot of not so small companies — not to mention a lot of owners who obviously don't think the Dragons are dead

So many reviewers in the computer press obviously never switched on their review samples of the Dragon. If the number of non-existent Rom-bugs they all found is anything to go by it amazes me that it sold at all.

The Dragon is without a doubt far superior to the BBC, Spectrum and QL (I nearly forgot the Spectrum Plus with its drop-off keys which allow one to completely redesign the keyboard layout) etc, which is all most magazines (including yourselves) seem to class as computers

If only the reviewers had bothered to admit that all they did was read the manual and base their review on that we might still have Dragon Data. If I appear to be upset it is because I am very disappointed to see the computer press are still kicking the Dragon when it is (a little) down.

Long live the Dragon.

J E Slad
3 Bridges Close
St Nicholas-at-Wade
near Birchington
Kent

Perchance to dream

This week we offer you the chance to enter an intriguing adventure puzzle based on the new epic adventure, *The Sandman Cometh* by Star Dreams

The Prize

The Sandman Cometh is an adventure through the dark side of the mind, where logic is twisted and opposites meet. The objects of material reality are seen in strange new guises, the substance of the mental world holds sway

To solve *The Sandman Cometh* you will need to learn the significance of dreams from Freud, symbols of reason from the world's greatest philosophers and jokes from the backs of matchboxes.

The Sandmand Commeth is divided into two 48K Spectrum adventures. You are the dreamer searching for clues in a maelstrom of mental turmoil — seeking only the means to wake up. There are quality graphics illustrating most of the stuff that dreams are made of, and a rich vocabulary.

The Bait

The *Popular Computing Weekly* school of hack psychology and fringe religion invites you to win five copies of the *The Sandman Cometh*. First prize will consist not only of the game itself but also a bottle of vintage champagne!

Venture into 1985 with sparkling tastebuds and a contented expression. Ten runners-up will receive a useful Spectrum toolkit utility program from Star Dreams, creators of *The Sandman*.

What to do

The Sandman Cometh is no ordinary program and to win it you'll have to complete no ordinary competition. In each of the next two weeks issues (December 13 and 20) we will be publishing a rhyming couplet somewhere in Adventure Helpline

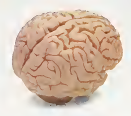
In the third week — the January 3 issue — we will print a listing for a game that combines a quiz with an adventure. Complete the clues, explore the adventure make use of the enigmatic advice offered in the two rhyming couplets and you'll hear a tune

How to enter

If you think you know the tune, name it, with a brief explanation of what you did to discover it (you can't get it just by looking at the listing incidentally) and send the details to Sandman Competition *Popular Computing Weekly*, 12-13 Little Newport Street, London WCH7PP by 1 February 1985. The first 15 senders of correct entries get the prizes and the editor's decision (as usual) is final

Our new software makes the most of yours.





By any standards, the Activision Designer's Pencil is a unique piece of software With it, you can design, draw, plan.

You can draw the world and everything that's in it.

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You can produce complex designs in no less than sixteen different colours

You can write and develop your own programs, without having to understand Basic.

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As you use the Pencil, it will reveal the full potential of your computer, in the most entertaining way possible.

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Are you only using

To only play games on a Commodore computer is like asking Albert Einstein to work out the square root of four.

The computer's brain barely ticks over.

To really stretch it, you need more interesting software programs. For example, record keeping, interactive education, stimulating adventure games or word processing.

And for those you need peripherals.

Like a Commodore disk drive, a really fast storage and retrieval system with a vast memory.

Or a Commodore cassette unit, the inexpensive way of loading and storing programs.

For those who like the idea of text and graphics being more alive and having greater clarity than on a TV, there's the Commodore colour monitor.


COMMODORE MPS801
Dot matrix printer £230.00
Tractor feed. Print speed
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Dot matrix printer £345.00
Friction feed for standard
paper. Print speed
60 characters per second
COMMODORE DPS1101
Daisy wheel printer £399.99
Letter quality print on
standard paper. Print speed
18 characters per second
COMMODORE 1520
Printer plotter £169.99. For
charts and graphs. Print speed
14 characters per second.
COMMODORE 1541
Disk drive £229.00.
170K memory 5¼" diskette
COMMODORE 1531
Cassette unit. For Commodore
16 and Commodore plus/4
COMMODORE 1530
For Commodore 64
£44.95 each
COMMODORE 1701
Colour monitor £230.00
JOYSTICKS
(prices from £7.50)
PADDLES (£13.50)
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And for hard copy, there are our four printers and a printer plotter. These will preserve on paper–in colour, black and white, chart form, graphs or text, the fruits of all your labour.
Finally, for more exciting games, there are joysticks and paddles.
So use your brain. And make sure you use all of your computer's brain.
FOR FURTHER INFORMATION TICK ONE (OR MORE) OF THE BOXES ABOVE AND SEND TO THE COMMODORE INFORMATION CENTRE, 1 HUNTERS ROAD, WELDON, CORBY NORTHAMPTON NN17 1QX. TEL CORBY (0536) 205252
NAME
ADDRESS
PE PCY 1-84
commodore

Lunar Module

Your chance to make that giant leap for mankind on the Dragon 32 by Ashley Watson

This program simulates the landing of lunar module on the surface of a planet. The speed at which the craft falls, etc is quite accurate because a number of equations are used — Lines 3030 to 3090 — which calculate fuel used, fuel left, mass of module, velocity and height above the planet's surface.

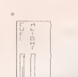
On a successful landing, the speed at which the landing took place will be shown. Full instructions are shown within the Dragon.

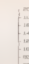
Program Notes

Lines	
10-210	Initialise
1000-1120	Main loop
2000-2060	Check keyboard
3000-3100	Calculate
4000-4060	Delay
5000-5140	Crash/land routines
6000-6150	Display instruments
6160-6230	Print space ship
7000-7040	Draw landscape
8000-8130	Instructions
8800-8860	Another go?
9000-9300	Used to set up display
9310-9390	Data for letters, numbers and machine code



THE FOLLOWING IS A SCREEN DUMP OF THE PROGRAM

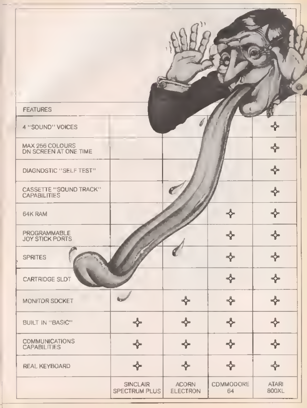




200
180
160
140
120
100
80
60

```
10 REM
20 REM initialise
30 REM
40 CLEAR 100,32700
50 DIMW$(26),NU$(10),R(10),R1(10)
,R2(10),R3(10)
60 FORA=1 TO 26:READW$(A):NEXT
70 FORA=1 TO 10:READNU$(A):NEXT
80 PCLS:FORA=0 TO 10:READ DA:POKE1536+
(A*32),DA:NEXT
90 FORA=0 TO 7:READ DA:POKE1538+(A*32)
,DA:NEXT
100 FORA=32701 TO 32738:READB:POKEA,
B:NEXT
110 GET(16,0)-(24,8),R2,G
120 GET(0,0)-(8,10),R,G
130 GET(100,100)-(108,110),R1,G
140 GET(100,100)-(108,108),R3,G
150 GOSUB 8000:GOSUB9000
160 V1=100
170 H1=1000:H=H1
180 F1=500
190 M1=2500
200 MU$="L80T80V"+AV.28V.0FV15D"
210 CR$="01T255L255BAG"
1000 REM
1010 REM main loop
1020 REM
1030 GOSUB 6000
1040 GOSUB 2000
1050 IF H1 1 THEN 5000
1060 GOSUB 3000
1065 IF H1 1000 THEN CLS:PRINT" THE
PLANET IS NOW OUT OF RANGE
DUE TO OVER THRUSTING.
MISSION FAILED":GOTO8500
1070 GOSUB 4000
1080 IF H>=200 AND H1<200 THEN F4=1
ELSE F4=0
1090 IF H<=200 AND H1 200 THEN F5=1
ELSE F5=0
1100 IF F5=1 THEN C=1000:GOSUB 9210
1110 IF F4=1 THEN C=-90:GOSUB9210:GOSUB70
1120 GOTO 1020
2000 REM
2010 REM check keyboard
2020 REM
2030 A$=INKEY$:IFA$="" THEN 2070
2040 J=ASC(A$)
2050 IF J 48 OR J 57 THEN 2070
2060 F=J-48:GOTO2080
2070 F=0
2080 IF F 0 THEN F=F*1000 ELSE F=0
2090 RETURN
3000 REM
3010 REM calculate
3020 REM
3030 V=V1:H=H1:F2=F1:M=M1
3040 A=(F/M)-2
3050 V1=V-A
3060 H1=H-V
3070 U=(F/5000)*50
3080 F1=F2-U
3090 M1=M U
3100 RETURN
4000 REM
4010 REM delay + print thrust
4020 REM
4030 IF F 0 THEN PLAY MU$:FL=E6+2:FM=
E6+10:PUT(128,FL)-(136,FM),R2,PSET
ELSE FL=
0:FM=0
4040 FORB=1 TO 300:NEXT B
4050 RETURN
5000 REM
5010 REM crash or land
5020 REM
5030 IF V1 5 THEN 5100
5040 REM
5050 REM crash routine
5060 REM
5070 FORQ1=1 TO 13:CIRCLE(130,175),Q1:
PLAY CR$:NEXT Q1
5080 FORQ3=13 TO 1 STEP-1:CIRCLE(130,
175),Q3,0:PLAY CR$:NEXT Q3
5085 CLS:PRINT"YOU CRASHED AT A SPEED OF ";7
```

continued on page 20



FEATURES				
4 "SOUND" VOICES				✧
MAX 256 COLOURS ON SCREEN AT ONE TIME				✧
DIAGNOSTIC "SELF TEST"				✧
CASSETTE "SOUND TRACK" CAPABILITIES				✧
64K RAM			✧	✧
PROGRAMMABLE JOY STICK PORTS			✧	✧
SPRITES			✧	✧
CARTRIDGE SLOT			✧	✧
MONITOR SOCKET		✧	✧	✧
BUILT IN "BASIC"	✧	✧	✧	✧
COMMUNICATIONS CAPABILITIES	✧	✧	✧	✧
REAL KEYBOARD	✧	✧	✧	✧
	SINCLAIR SPECTRUM PLUS	ACORN ELECTRON	COMMODORE 64	ATARI 800XL

```
5086 PRINT"METRES PER SECOND"
5090 GOTO 8500
5100 REM
5110 REM land routine
5120 REM
5130 CLS:PRINT"YOU LANDED AT
A SPEED OF";Z
5132 IF Z 0 THEN Z=.1
5135 PRINT"METRES PER SECOND"
5140 GOTO 8500
6000 REM
6010 REM display instruments
6020 REM
6030 X=INT(F1+0.5):Y=INT(H1+0.5)
:Z=INT(V1+0.5)
6040 IFY<0 THEN Y=0
6050 GOSUB 6160:GOSUB 6070
6060 RETURN
6070 REM
6080 REM update fuel/height level
6090 REM
6100 X=X/5.6:Y=Y/12
6110 LINE(39,170)-(39,81),PRESET
6120 LINE(20,170)-(20,81),PRESET
6130 LINE(20,170)-(20,170-X),PSET
6140 LINE(39,170)-(39,170-Y),PSET
6150 RETURN
6160 REM
6170 REM update space ship
6180 REM
6190 E8=E6:E9=E7
6200 IF H1<200 THEN Y8=Y/1.18 ELSE
Y8=Y/5.9
6210 E6=180-Y8:E7=170-Y8
6220 PUT(128,FL)-(136,FM),R3,PSET
6230 PUT(128,E8)-(136,E9),R1,PSET
6240 PUT(128,E6)-(136,E7),R,PSET
6250 RETURN
7000 REM
7010 REM draw landscape
7020 REM
7030 DRAW"BM80,190M+20,-23M+15,+12M+31,
+0M+5,-13M+4,+5M+7,-3M+9,+20M+5,+2M+12,
-7M+20,+21"
7040 RETURN
8000 REM
8010 REM instructions
8020 REM
8030 CLS
8040 PRINTTAB(10);"LUNAR MODULE"
8050 PRINTTAB(10);"----- ------"
8060 PRINT"(C) 2/3/84 BY ASHLEY WATSON"
8070 PRINT
8080 PRINT" YOU ARE IN CONTROL OF ONE OF
THE NEW X-ASH-X ROCKETS AND YOU MUST
LAND YOUR ROCKET ON THE
SURFACE OF THE PLANET ASHTRON."
8090 PRINT" TO SLOW THE ROCKET DOWN USE
THE THRUSTERS (KEYS 1 TO 5 -1 ISWEAKE
ST) BEFORE THE FUEL RUNS   OUT.
TO LAND SUCCESSFULLY THE   SPEED MUST
BE BELOW 5METRES PERSECOND."
8100 PRINT"(HEIGHT IS SHOWN ON
THE RIGHT)"
8110 PRINTTAB(8)"PRESS ANY KEY";
8120 A$=INKEY$:IFA$=""THEN 8120
8130 RETURN
8500 REM
8510 REM another go ?
8520 REM
8530 PRINT:PRINTTAB(8);
"ANOTHER GO (Y/N)"
8540 A$=INKEY$:IFA$<>"Y"AND A$<>
"N"THEN 8540
8550 IF A$="Y"THEN RUN
8560 END
9000 REM
9010 REM set up display
9020 REM
9030 PMODE4:SCREEN1,1:PCLS
9040 DRAW"BM10,10D170R60U170L60"
9050 DRAW"BM16,80R/D90L/U90BM35
,80R/D90L/U90"
9060 Z$="FUEL":Y=16:Z=20:GOSUB 9110
9070 Z$="HEIGHT":Y=35:Z=20:GOSUB 9110
9090 C=1000:GOSUB 9210
9100 RETURN
9110 REM
9120 REM draw letters
9130 REM
9140 FORT=1 TO LEN(Z$)
9150 Q=ASC(MID$(Z$,T,1))-64
9160 IF Q<0 THEN T$=NU$(Q+17)
ELSE T$=W$(Q)
9170 DRAW"BM"+STR$(Y)+","+STR$(Z)+T$
9180 IF B<0 THEN Y=Y+6 ELSE Z=Z+10
9190 NEXT
9200 RETURN
9210 REM
9220 REM draw numbers
9230 REM
9240 EXEC 32707
9250 DRAW"BM210,10D170":C1=C/10:FOR
B=10 TO 187 STEP 17
9260 DRAW"BM210,"+STR$(B)+"R4"
9270 Z$=STR$(C):Z$=MID$(Z$,2)
9280 Y=219:Z=B+2:GOSUB 9110
9290 C=C-C1:NEXT
9300 RETURN
9310 DATA "Z","Z","Z","U6R3F2D3G2L3",
"NR6U3NR3U3R6","U4NR4U2R6","U6NR6D6R6U3L
"U6D3R6U3D6","BM+3,+0U6","Z","Z","NR6U6
","Z","Z","Z","U6R6D3L6","Z","Z","R6U3L6U
3R6","BM+3,+0U6L3R6","NU6R6U6","Z","Z",
"Z","Z","Z"
9320 DATA"R4U6L4D6","R4L2U6G2"
9330 DATA"NR4U3R4U3L4","R4U3NL3U3L3"
9340 DATA"BM+4,+0U6M-4,+4R4","R4U3L4U3R4
9350 DATA"R4U3L4D3U6R4","BM+4,+0U6L4"
9360 DATA"U6R4D6L4U3R4","BM+4,+0U6L4D3R4
9370 DATA 16,56,40,124,254,56,56,56,214,
214,214
9380 DATA 24,60,126,126,60,60,24,24
9390 DATA 22,6.9,-9,223,0,166,140,252,
16,174,140,244,31,33,95,167,132,92,225,
140,234,34,4,48,1,32,244,49,168,32,16,
172,140,224,37,??,57
```


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Bombs out

Program *QL Machine-Code Editor/Assembler* **Micro** QL **Price** £29.95 **Supplier** McGraw Hill Book Company Maidenhead Berkshire.

This is a product from the software arm of McGraw Hill, and is advertised along with their QL machine-code book

It consists of two separate programs — a screen editor, and the 68008 assembler

The editor is actually written in SuperBasic, which has its advantages and disadvantages The advantages are that it is easy to write and debug, but the disadvantage is the complete lack of crashproofing Note that I have not mentioned speed as it is not really noticeably slow — in fact, it is still faster than Psion's *Quill* The problem occurs when you Save or Load a file — if any error occurs, such as not finding the file, the program bombs out with an error message

My preliminary instructions didn't mention what to do after it crashes out — which it did quite often. After contacting the authors, they came back to me with a *Goto* command that would re-start it.

The editor itself has the barest of features, and though it has a (slow) search facility, it does not have a search and replace option which, because of its non standard syntax, is rather necessary if using files from other assemblers. Having entered a program and saved it, it would be useful to have an option in the editor to load the assembler

The assembler is thankfully written in machine-code and runs as a proper job so would run concurrently with the editor if it didn't insist on *Newing* itself. It asks for three filenames, for the source, the object code, and the listing, then gets on with it. It is fast, with none of the overlaying problems I experienced for example on the Metacomco assembler

The assembler itself is almost of Motorola standard — it doesn't need the *Quick* or *Address* operands in its instructions, and adds them itself, but strangely rejects any instructions that actually specify them. It also has a non-standard way of defining data, using Z8000 mnemonics instead of 68000, and always requires colons after its symbols for some strange reason

The editor is OK, but, it was converted to machine-code with error trapping it would be vastly improved.

The assembler is non-standard, as is Metacomco's, but works quickly Compared with Metacomco's, it's a case of you pays your money, you takes your choice but the QL assembler market is about to get very crowded — I have just got the official Sinclair one, and two others are also imminent.

With all these assemblers available for the QL, why doesn't some other software come out for it?

Andrew Pennell

Landlubber

Program *Yacht Race* **Price** £8.95 **Micro** Spectrum 48K **Supplier** Hill MacGibbon, 92 Fleet St, London EC4Y 1DH.

With flight simulators reaching greater and greater sophistication where do you go next? How about a yacht simulator? It certainly strikes a note of originality amongst the usual churning out of programs

Hill MacGibbon have given their range the title Games that stretch the mind and it is in the area of education that I give this highest marks For a confirmed landlubber like me, it's a real pleasure to develop an easy familiarity with terms like tacking and gybing and to be honest there's a much greater chance that such gems will be put to practical use in a real boat than the hours of practice put in on *Fighter Pilot* ever will.

How accurate a representation of the behaviour of a real yacht this is, I am truly not qualified to say, however the presentation is faultless with, as would be expected from a publishing company, excellent supporting documentation and maps. Unfortunately this is accompanied by a pretty excessive price tag They have also thoughtfully provided a 'save to microdrive' option.

The game itself is well programmed by Five Ways Software, but is let down slightly by the graphics. Doubtless they accurately reflect the speed of the yacht but a lot of the time there seems to be nothing happening at all — more detail is needed to keep the display interesting The only exception is the computer controlled boat which disappears so rapidly into the horizon that you can't help wondering whether it cheats. For those good enough to give it a real race the game must be much more exciting, but I found it a bit too pedestrian and pricey to have more than limited appeal.

Tony Kendle

Insight

Program *Henry IV Part I* **Micro** Commodore 64 **Price** £7.95 **Supplier** Penguin Books, Harmondsworth, Middx

Educational software needs to be treated with some caution. I often have the feeling that you would be better off spending your money on a good textbook, rather than a computer program of debatable benefit. However, the Penguin Study Software Series of study aids for Shakespeare's plays overcomes my reservations, from the evidence of the program for *Henry IV Part One*, anyway

The program works like a small database system containing references to a number of key characters and topics relevant to the play, eg Falstaff, Hal, Henry, loyalty, kingship

You select the character or topic of interest to you using an easy-to-use search menu, and the program will then present you with a series of references to the chosen subject. If you select more than one subject, the program gives you only the references which link all the names or concepts selected. Each reference gives you the Act, Scene and Line in the play so that you can refer to the original text, and it also provides a paragraph of comment, which points out the particular significance in the play of this reference The comments not only inform, they question — making you think through your understanding of the play

This is a well designed educational package where the computer is used to provide input and give insight in a way which could not be easily achieved using a book of the play on its own. It should form a useful addition to the study of this play

Richard Corfield



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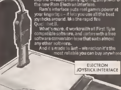
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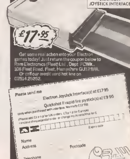
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Sounds good

Program *Se-Kaa of Assiah* **Price** £2.99 **Micro** Spectrum 48K **Supplier** Master Vision, Park Lome, 111 Park Road London NW8 7JL

Mastervision is Mastertronic's up market label, and my copy of *Se-Kaa* came in a video case with accompanying booklet. It's an adventure with illustration — or rather it's a mainly illustrated adventure, in two parts. The first is to find various sacred objects in the Castle of the Dead, which is haunted by the Dark Hordes. These objects then have to be returned to their rightful places.

In a week which has produced many good new adventures this one is in some ways, a disappointment. The illustrations are rather good, with animated flames on the torches and a useful compass indicator at the top of every scene. There's also far better use of sound than in most adventures (fall off a path and see what I mean).

What is lacking is content. With a good number of rooms all made up of the same elements, a sense of repetition soon sets in. There are too many empty places — in fact I was left wondering whether I'd missed something, but didn't have the incentive to go back and find out what. As for the Dark Hordes, I kept getting warnings that they were following me but never met them. Sad, because a good bit of slaughter would have relieved the tedium.

There's undoubted programming talent behind this game but it's all rather like a picture book without a story. Obviously for the price it's no rip off and is certainly worth a look if you're an absolute addict.

John Minson

Cat-napping

Program *Show Crazy* **Price** £5.95 **Micro** Spectrum 48K **Supplier** Scoft, 298 Manchester Road, West Timperley, Altrincham, Cheshire WA 14 5NB

Lost — Ginger Cat — Answers to the name of Purrfect Pest — Reward.

I can't think of any other quests to find lost moggies, but that's the theme of this adventure and it makes a pleasant change that the worst that can happen to you are fractures.

Obviously, to add a sense of urgency to the cat hunting calls for an incentive — in this case it's the impending show. Hints as to where the elusive feline has been abound, adding to your frustration, and even when he's found and captured you still have to get him to the show.

At heart *Show Crazy* is a rather obviously *Quill*ed effort, despite the addition of somewhat primitive graphics. While experienced adventurers will romp through it, it should suit the less experienced player.

Its novel subject and light tone make it highly playable and while it is a little over priced it should provide a welcome change.

John Minson

Harping on

Program *Jack and the Beanstalk* **Micro** BBC B **Price** £7.95 **Supplier** Superior Software, Dept C, Regent House, Skinner Lane, Leeds

The fairytale of Jack and his adventures with a magic beanstalk is the basis for Andrew Harley's latest game from Superior Software. To be cruelly analytical it is a ladders and platforms game — but a first-rate variation on the theme.

You control (from the keyboard only) Jack's movements which are fast and well animated. Climbing the beanstalk is not as easy as it looks — grabbing golden eggs and harps (could Guinness have been an inspiration?) and above all, the Giant's bags of gold. As per the original story, the Giant gets upset and pursues you very rapidly indeed. Dodging is extremely hard and the recommended escape is to slide down the beanstalk and grab an axe to cut off his descent. A fresh beanstalk will grow to let you try for more.

There are an assortment of other dangers to dodge while this all goes on. Smoke blowing from the cabin chimney may dislodge you from the beanstalk. Snails attack you in the Giant's lair. If you're quick, though you can dig holes to kill off the snails and slow down the big himself.

It may not be the most novel of programs but it is actually quite a fine game.

Dave and Jan Watterson

Get your kicks

Program *Smash and Grab* **Micro** Electron **Price** £7.95 **Supplier** Superior Software, Regent House, Skinner Lane, Leeds

Ever fancied robbing a bank with the knowledge you have three chances of getting away with millions of pounds? Well, here is your chance.

You may have three chances and there may only be one policeman chasing you but there are also floating dustbin lids and flying police-cones to contend with.

To explain: first you kick a police-cone through a bank window. This releases bags of gold which then cascade down the screen. Your job is to run up and down ladders and across platforms collecting the bags of gold.

A lot of kicking is encouraged in this game. If you aim a sharp boot at a flashing police box (one of the old Tardis-shaped sort) the traffic lights for some reason change to red and this gives you the chance, just by touching him, of knocking the poor bobby into the water.

In short, a reprehensible little game — I liked it.

Fred Short



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Demolish

Program *Catastrophes* **Micro** Commodore 64 **Price** £6.95 **Supplier** Mirrorsoft, Holborn Circus, London EC1

You sometimes see buildings being erected in some unlikely locations, but rarely are they as inhospitable as the site in *Castrophes*.

In this game, you have to build a skyscraper on a tiny island in an area wrecked by earthquakes, hurricanes, lightning and floods.

The building blocks are ferried in by boat, and you have to airlift them into place by helicopter. This aspect of the game is not particularly difficult. However, the natural disasters occur amazingly often, and large parts of the new building are often demolished. Each type of catastrophe causes a characteristic sort of damage for example, tall narrow buildings are particularly prone to collapse in an earthquake. Fortunately, you get a few seconds warning of any impending disaster so you have a few more blocks to minimise the damage.

You score points for each block and each new storey in the building, but you lose again when the building is damaged.

The basic idea is quite simple, yet it makes an unusual concept for a game. Something a bit different which, surprisingly, turns out to be quite compulsive. The graphics and sound proved to be rather disappointing and something more dramatic for the disasters would have livened it up.

I eventually become frustrated after my new building had been repeatedly demolished by persistent catastrophes.

Richard Corfield

Shattered

Program *MacMan's Magic Mirror* **Price** £9.99 **Mirror** Spectrum 48K **Supplier** Sinclair Research Limited, Stanhope Road, Camberley, Surrey GU15 3PS

The booklet accompanying this looking glass lesson explains the importance of educating four to eight year olds in the skill of recognising symetry in patterns.

That is why MacMan, the symetrical Scot wanders around various mirrors in search of perfect balance.

There are three games to be completed. Pegs have to be placed on one side of a line in positions that mirror those already on screen, after which a mirror jigsaw has to be constructed. Finally sections of geometrical patterns have to be shifted into place.

The first time the child has the help of a grid, but for the second he or she is strictly on his or her own — even adults will find this tricky. Finally a score, plus high score, are displayed.

Four different types of mirror are available — diagonal being particularly tricky. Three 'speeds are also available, giving a longer or shorter

continued on page 32

Erratic

Program *Zany Kong Junior* **Micro** Electron **Price** £7.95 **Supplier** Superior Software, Regent House, Skinner Lane, Leeds

Every computer owner must be familiar with the game *Donkey Kong*. Just about every computer has a version of *Kong* available for it and here for the Electron (the BBC's baby?) is *Zany Kong Junior*.

The theme has been subtlely changed to avoid the 'woman-in-peril' scenarioes and this version has poor Zany Kong kidnapped by the evil Morris. You must collect the keys and release him from the iron barred cage which holds him prisoner at the top corner of the screen.

Each game opens with Zany Kong being winched in his cage to the top of the screen, acompanied by appropriate music which plays throughout the game.

As usual your task is not easy — involving climbing up a series of ropes or vines preferably in the correct order. Getting in your way are creepies called snappers, and aardvark birds — whatever they are, I always thought the aardvark was related to the pig family — which seem to commute up and down the vines in an erratic manner as though they know just what your next move is.

Obviously *Kong* games are still very popular. This version for the Electron must rank as one of the best for the machine.

Fred Short

Frozen

Program *Percy Penguin* **Micro** Commodore 64 **Price** £7.95 **Supplier** Superior, Ground Floor, Regent House, Skinner Lane, Leeds.

If *Percy Penguin* had been published about a year or 18 months ago, it would have seemed pretty good compared to the relatively small number of decent games then available for the 64.

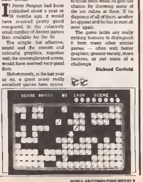
The simple but effective, sound and the smooth and colourful graphics, together with the uncomplicated action, would have seemed very good then.

Unfortunately, in the last year or so, a great many really excellent games have appeared, making this now look very average.

Percy Penguin finds himself in a maze full of ice cubes. Unfortunately for Percy, there are some deadly Sno-bees in the maze with him. The only way he can survive is to avoid contact with the Sno-bees, and to crush them when he gets the chance by throwing some of the ice cubes at them. If he disposes of all of them, another lot appear and he has to start all over again.

The game lacks any really striking features to distinguish it from many other similar games — often with better graphics, greater variety, more features, or just more of a challenge.

Richard Corfield



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3 Channel Sound Synthesizer



Any microcomputer is capable of manufacturing sound, however in order to produce a single octave 'C' note with a frequency of 8372 Hz the signal needs attention over 16,000 times per second.

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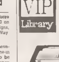
Reviews

Advanced

System *VIP Terminal* **Micro** Commodore 64 **Price** £50 on disc **Supplier** Impex Designs, Metro House, Second Way Wembley, Middlesex

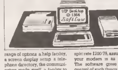
Modems and the development of phone-in systems seem to be getting a good deal of attention these days. The speeding up of the British Telecom acceptance procedures for modems and the increasing interest of large companies such as Commodore and ICL in the commercial potential of phone-based communications are helping to generate interest. However, we are still somewhat behind the USA in this field and many of the new systems appearing in the UK now are based on American experience.

The VIP Terminal software, developed in Minneapolis, is a good example of the level of sophistication which can be achieved. The package gives nearly all the facilities required to fully exploit phone communications. Nine major functions allow you to set up a wide range of options: a help facility, a screen display setup, a telephone directory, the communication mode itself, a facility to pre-program short messages to certain keys, a real-time clock with alarm, disc management and file editing, and a printer-driver routine.









The display can be modified to show 40, 64, 80 or 106 columns of text, in any colour. Of course a monitor is suggested for the highest resolution. Automatic wordwrap can be switched on, and audible margin-warnings can be requested.

The terminal handles baud rates from 50 to 2400 including split rate 1200/75, assuming that your modem is as versatile. The software gives you full control of such things as parity, stop-bits, duplex, linefeeds, pause characters, the sending of special characters, and so on. All those things which may change from system to system and can cause major problems for the inexperienced or non-technical user, such as myself. It is possible to call for help or modify these settings whilst in the communications mode.

The phone directory lets you keep phone numbers, settings for different systems (such as baud rate), and log-on messages. If you have a suitable modem you can even get the software to auto-dial and log on for you. Unfortunately this is where the American software is of limited use. Commodore have released a number of modems in the States which are driven by this software, but many modems sold in the UK do not use the same method for auto-dialling.

The disc commands let you set up files on disc, modify files, send stored files through the modem, and receive and store files. Non-Commodore printers as well as the various types of Commodore printer are allowed for to produce a hard-copy of your communications.

The VIP Terminal is a very advanced package, giving facilities and a level of control usually reserved for business micros. The cost takes the software out of the games-software league, and deservedly so. A pity that the auto-dial may only be used by some, although most modems (thanks to BT) do not support this facility in any case. Incidentally the software cannot be used to drive the Compunet modem, nor can it be used to give full access to Compunet.

John Cochrane

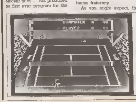
Deuce

Program *Match Point* **Price** £7.95 **Micro** Commodore 64 **Supplier** Psion Limited, 22 Dorset Square, London NW1

How about this for a last-minute contender for the Christmas No 1 slot? Psion — better known for its Sinclair titles — has produced its first ever program for the Commodore 64, a conversion of its excellent Spectrum release *Match Point*, the tennis simulation to beat all tennis simulations.

So many Spectrum to Commodore conversions turn out to be disappointing — *Match Point* is a welcome exception. It all bodes well right from the speedy loading, followed by the title screen depicting a hunky specimen of the tennis fraternity.

As you might expect, the graphics are bolder, even more life like than the original, as the players skedaddle round the court on little legs at a great rate.



Choose from three speeds of play according to ability and how much you want to thrash the computer at its own game. The quarter final's speed is good for starting off with to enable you to work out how best to play the shots. Semi-final pace gives a good playable game, while the finals will soon have you reaching for the sweatband and umpire's refreshments yourself.

Almost as much fun as playing is watching two players battle it out in demo mode — no tantrums over dubious line calls here, and the Commodore crowd are a passive lot too — they don't turn their heads to follow the ball as they did on the Spectrum.

Three final points worth mentioning: the game is joystick controlled only, the blurb on the inlay says to abort a match and return to the main menu press *F1*, whereas on my copy *F2* did the trick, and if you press the space bar while serving, you can watch the receiver juggle about on the baseline, just like real life.

Christina Erskine

time to complete each task.

Given this element of competition it seems unfair not to display either score or time counting down. I think most children will feel cheated to suddenly find that the mirror 'shatters' because time has expired. And the use of the cursor keys is bad for little hands — why not user-definable ones?

Given these rather mayor reservations, the game should serve its purpose providing there is suitable parental supervision, something the booklet emphasises.

John Mason

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Welding by West Ham

***Christina Erskine** grapples with the giant robots at Ford's Dagenham car assembly plant*

In a recent Reith lecture, Professor John Searle of the University of California criticised the development of domestic robots: "We are frequently assured that we are on the verge of having household robots that will do all the housework, amuse us with lively conversation and take care of us in our old age. That of course is so much nonsense."

It certainly is. The home robot industry has so far been a bit of a flop — and Androbot's Topo device, for example, was greeted with disappointing sales, both here and in the US.

But industrial robots have been around for a long time, and have reached a startling degree of sophistication.

At Ford's massive Dagenham plant, for instance, where up to 1000 Sierra and Fiesta cars are produced each day, 127 robots are used in body construction of the vehicles alone.

I met Dave Hutchinson, Dagenham's manufacturing engineering manager, for a tour of the body construction complex, and a close-up view of the robots themselves.

The assembly plant is so vast — some 2½ million square feet — that walking round it is out of the question. We travelled by electric car.

"Ford uses four different makes of robot," Dave explained. "There are 42 Kuka models, and the same number of Nimaks which are German manufactured, 12 Swedish Asea robots, and 24 Cincinnatis, which, surprisingly enough, are made in the US. And that's just in body construction."

The word 'robot' conjures up images of the all-walking, all-talking machines Professor Searle decried and the staff at Ford prefer for some reason best known to themselves to call their robots UTDs, or Universal Transfer Devices.

The first computer controlled UTDs were introduced in 1981, for the launch of the Sierra, successor to the immensely popular Cortina range of cars. The entire body construction of the Sierras is fully automated, untouched by human hand.

Fiesta models are also finished off by UTD, but much of the spot welding is still done with a portable welding gun wielded by hand.

The Sierra robots act as a direct replacement to the workers who were previously on the assembly lines. Most are floor-mounted, but some hang from gantries about five feet above ground level.

The movement of the Sierra panels along the lines is controlled electronically, so that the panels pause long enough at each UTD for it to spot-weld the relevant points.

The robots vary in size, from the small, Topo-sized Aseas to the hulking Cincinnatis, which deal with the main welding, the last operation in the body construction plant.

Most are constructed as giant arms, set at their 'shoulders' into the floor or gantry. Their hands take the form of concentrated nozzles to fire the welds. Each robot has its own independent IPC processor, controlling its precise movements. Although they were all bought 'off-the-peg' by Ford, some, notably on the side frame assembly line, are reprogrammable on-site.

The Sierra first begins to take shape on the 100 yard-long side-frame assembly line. The side panels themselves are made by Fiat subsidiary Comau, and are loaded on to the beginning of the line. Floor and gantry mounted Kukas and Nimaks spot weld the joints together as the frames pass through — window frames to the rear side panel and so on. After welding, the frames then have a sealer sprayed on by a smaller Asea robot.

"Before we had the Asea doing the sealing, the men on this job were always getting sealer over themselves. The Asea doesn't miss and gets the quantities right each time," said Dave. "Our own technical engineers also fitted an electronic sensor in the form of a small grey wire attached to the end of the Asea's arm — this checks for any assembly faults in the operation."

ROBOT CONTENT

KUKA	42
NIMAK	42
CINCINNATI	24
ASEA	12
TOTAL	120

FINISH WELDING

BODY FRAME ASSEMBLY

INTERSTAGE

PRELOAD

BODY SIDE ASSEMBLY

ROBOT INSTALLATION — SIERRA BODY CONSTRUCTION, DAGENHAM

The side assembly actually comprises two "conveyor belts" operating simultaneously — one for the left-hand side, one for the right.

The finished frames are picked off the assembly line by a Niko 'arm and hand' device and transferred on the next gantry conveyor. The giant scooping 'hand' of the Niko is one of Ford's newest developments at Dagenham.

The assembly of the Sierra underbody is carried out independently from the side assembly — the two parts being brought together when the main



frame is constructed.

With the underbody, Kuka robots are again used for spot welding "These are what we call hard automation robots, because they can't be reprogramed," said Dave

"The Kukas you saw on the side assembly are all reprogrammable — you can alter the speed at which they work the number of spot welds they make, and so on. A separate hand-controlled unit can be plugged in and the new motions gone through, physically, using the unit. Then you press a button, and the movements are stored in the robot's memory The new programs are generally stored on tape and two back up copies made

"However, the underbody construction is all done with hard automation — the main panel is loaded in at the start, the rear and front floors and engine compartment are then spot welded on to complete the assembly An electronic signal is also sent to the underbody assembly section to determine whether the components are to be set up for a left-hand or right-hand drive car

'Automatic transfer devices similar to the Niko hand' pick up the completed underbody — the part we call the 'marriage' — and bring it together with the side frames for the main body frame assembly

"The main body-frame assembly is still done by hand," admitted Dave "We simply haven't found a better way yet The staff on this line use simple clips to attach the roof panels each side panel and the underbodies together"

Next the assembled Sierra bodies begin their trip down the long line of bulky Cincinnati robots to finally weld the frames together

The 24 Cincinnati robots which finish off the welding are the most powerful. Standing about six feet high their precise movement is controlled by computer operated hydraulic pistons and activators — rather than by electric motors Whereas the spot-welding and clipping, up till now, has only involved the minimum number of connectors and robot movements to hold the frames together at this section of the line, the Cincinnatis giants provide the main strength welding finish.

They were among the first robots to be used by Ford and are the only ones at Dagenham to have been given names — two are called Sarah and Anne and those on the second line are called after football teams — West Ham, Arsenal and Fulham.

Intrigued, I had to ask "It was one way of making the robots seem less threatening when they were installed," Dave explained. "Some were named after daughters of the floor workers"

The final operation to take place in the body construction area is quality control Before leaving in an elevator for the first floor to have the doors and boot lids fitted, the underbody is placed on a large pressure sensitive bed Electronic sensors connected to a Hewlett Packard computer check the position of each specific component. The charts produced from the computer immediately show if anything has been finished incorrectly — even a millimetre out of alignment can be detected.

Dave Hutchinson

The robots do not stop here with the assembly of the main body — the paint shop is also now fully automated too

First the entire body frames are cleaned, degreased, electro coated — to prevent corrosion — sealed at the joints, and cleaned again to remove any lingering dirt or dust. Surprisingly, here the final cleaning is done using ostrich feathers Robot ostrichs? Apparently not

Ostrich feathers are expensive, but last about a year before they need replacing Their electrostatic properties make them the best for the job — far better than the plastic strips used in an automatic car wash.

The robots are allowed the last word though — they apply each of the seven coats of paint applied to the Sierra models

The Sierra assembly line in the Dagenham plant is the most technologically advanced in the country The cost of all the robots now installed on the line amounts to some £260m.

"We went by the robot route to save on constant labour costs and become more efficient' said Dave "Obviously though we still need the staff to supervise and maintain the robots'

The question of how the robots have taken over from manpower is inevitably a touchy one In the 1970s — pre-robot days — there were about 50 people working on side frame assembly alone Today that number has been whittled down to a fifth. And robots don't have salaries and paid holidays

Ford maintains that such automation has had to be introduced in order for the company to remain competitive

Performing Siel

Hardware Siel MK900 **Price** £499 (Midi interface £99, Software £30 approx) **Supplier** Siel UK, Ahed Depot, Reigate Road, Hookwood, Horley, Surrey

Much has been said of Midi recently. What began as a long overdue standard for musicians, enabling them to connect together instruments from different manufacturers, looks like being the spark which ignites a whole new area of computer music development.

The problem for computer owners is, that so far the jump into Midi has simply been too expensive, whatever their interest in music. Until recently the cheapest Midi equipped keyboard has been £700 at least.

However, the new Siel MK900 is a Midi keyboard for just over £400 — not much more than a good printer. It's a big step on the way to the time when a synthesiser is as common a peripheral as a joystick or light pen.

A synthesiser can give the current crop of computers musical possibilities they could never otherwise possess. Not only ergonomically — you can't play a Qwerty keyboard with any finesse — but also in terms of the quality and range of sounds available. The synthesisers on the market now are capable of such perfect mimicry of acoustic instruments that it's often difficult to tell the difference. Sound chips on available computers are capable of only three or, at best, four channels of sound. This last point means, basically, that you cannot even play simple chords.

But whilst all this is a pro-synthesiser argument, why involve the computer at all? Why not just buy the instrument? Time to look at the other side of the coin.

Casio and other manufacturers of cheap musical keyboards have spent much time, effort and money making those instruments as easy to play as possible. Casio and co know that the real money is not made from professional musicians but rather from dabbling amateurs who know a little music but want to learn more and who want to be able to crank out a few tunes at parties.

Casio tried many different techniques to help people learn music, some of their instruments had little lights — leds — that lit up above each note on the keyboard as a tune stored in its memory was played — the idea being that you would try to 'follow' the lights and thereby learn the tune. Other features, like one-note chords and auto base lines gave an automatic, if rather plastic accompaniment to your single finger melodies.

All this easy-play technology wasn't totally unsuccessful, but the inherent inflexibility of the system meant that the end results sounded like the kind of skull numbing ditties you hear in hypermarkets whilst shopping. What a computer can provide is the flexibility that was originally lacking. Using computer programs to learn about music will always be more successful than flashing leds or instant chords (unless it is absolutely horrendously written, which has too often been the case until recently) because it requires your response and through that response varies the end result.

For educational purposes you get more control with a computer in absolute terms. You get more flexibility in the sense that you can cover those areas you are most doubtful about in greater detail and at greater length. Equally it becomes harder for you to cheat — the computer can ensure than you understand some musical point before allowing you to continue.

For musicians linking a computer to a keyboard allows a freedom similar to that provided by wordprocessors to writers and typists previously accustomed to typewriters. Software packages can (and, in at least one case, do) allow for multi-part composition with instant playback of one or all parts. Sections of music can be rearranged, moved about, assigned to different instrument sounds and so on.

There are two ways of looking at the Siel MK900: as an instrument in its own right and as a computer controlled Midi keyboard. This being a computer magazine, we'll zoom through the former and look at the latter in more detail.

What you get for £449 is a five octave full size keyboard with ten preset sounds, ten rhythms, a sequencer which can remember 50 chords and 260 notes and various autoaccompaniment features.

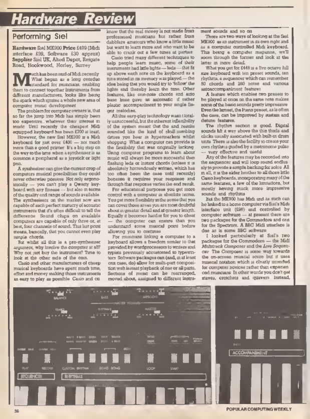
A feature which enables two presets to be played at once on the same note makes some of the basic sounds pretty impressive. Even the lamest, the Piano preset, as is often the case, can be improved by sustain and detune features.

The rhythm section is good. Digital sounds lift it way above the thin thuds and clicks usually associated with built-in drum units. There is also the facility to create your own rhythms guided by a metronome pulse — very effective and useful.

Any of the features may be recorded into the sequencer and will loop round endlessly to provide a simple backing for solos. All in all, it is the elder brother to all those little Casio keyboards, incorporating many of the same features, a few of the limitations, but mostly having much more impressive sounds and rhythms.

But the MK900 has Midi and as such can be linked to a home computer via Siel's Midi interface unit (£99) and controlled by computer software — at present there are two packages for the Commodore and one for the Spectrum. A BBC Midi interface is due as is some BBC software.

I looked particularly at Siel's two packages for the Commodore — the Midi *Multitrack Composer* and the *Live Sequencer*. The Composer is some way towards the on-screen musical score but it uses musical notation which is clearly intended for computer novices rather than experienced musicians. In other words you don't get staves, crotchets and quavers. Instead,





notes are notated with their letter and a number to indicate which octave you require, eg, C4 equals C in the fourth octave. The = and the $ sign are used to indicate sharp and flat respectively. Note length is expressed as fractions of 96, so a quarter note has a duration of 96/4 ie 24.

Tunes are created on one of six tracks (like a single line of monophonic, ie, single note music) which are then assigned to Midi channels. More than one track may be assigned to each Midi channel and in this way chords may be created using combined single tracks together.

Individual notes may be made staccato or legato by adjusting the 'gate on time figure' — basically slightly adjusting this figure makes the note a little longer or shorter without affecting the 'clock'.

Each track of music may be edited — notes may be removed, added, note lengths changed and so on, tracks may be saved to disc, loaded in, renamed or erased under your command. What does this mean in terms of the MK900?

The keyboard has two Midi channels 0 and 1. This means that it can can have two 'streams of information' operating independantly at the same time. If that sounds confusing it isn't, since in practice two Midi channels means that at any given moment two sounds may be used and within each sound the six tracks may be alloted. For example, by assigning tracks one to four to Midi 0 and tracks 5 and 6 to Midi 1 you have set up an arrangement whereby one sound (say, organ) can play chords, up to four notes and the other sound (say, synth) can play up to two notes on a lead line. I should add that whilst the computer is playing the keyboard you can still join in, using the same sounds.

On the Commodore you are provided with a total of 9000 notes to play around with, 1533 over the six channels enough for anything short of *The Ring Cycle*. The C4,E3=, D5 notation is obviously pretty irksome to tap into the keyboard but if, like me, your musical compositions don't get much beyond three note chords and one note lead lines it shouldn't be too much of a problem.

The live sequencer is, in a way, the Composer from the other end. Here you set up the program to receive information and play the keyboard. The border flashes as each note is 'received' by the computer although all that is recorded is the note information, not the particular tone you have set — you can change that as you wish.

The recorded notes are assigned to a given track and may be played back through the keyboard at a faster or slower speed. New tracks may be recorded and also played back — the effect is very much like having a multi-channel tape recorder with extensive over-dub facilities.

Obviously entering the music with the keyboard is much more convenient than typing in the notes on the Commodore but then you don't get the same degree of editing flexibility. You pay your money etc, etc. The MK900 is a high quality top-of-the-range portable with enough features and quality sounds to get music that doesn't sound bad with only a little effort. Add a Midi interface and you have, with the right software, an instrument on which you can compose multi-part music, create and replay many lines of melody and generally tinker to your heart's content.

The MK900 lacks two things: firstly it has presets and thus the sound creation is limited and secondly the Midi standard allows for the communication of velocity (how hard you hit the keyboard) but the MK900 is not a velocity sensitive keyboard. In this sense, buying the MK900 is not letting you use all the Midi features possible.

For my money the MK900 is the ideal instrument for those who want a starting point with computer music but aren't too worried about limited sounds and don't want to risk too much money. The auto features are particularly useful and with the software packages that will surely come, sophisticated and impressive arrangements can be created.

Graham Taylor



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Hardware Review

Compatible

Hardware *Saga 1 Emperor* **Micro** Spectrum **Price** £54.95 **Supplier** Saga Systems Limited, Woodham Road, Woking, Surrey

It has always annoyed me that so called 'professional keyboards' for the Spectrum have fallen short of anything that could really be used to obtain respectable typing speeds. Admittedly this is primarily the fault of the hopeless double shift and extended modes of the keyword entry system. These present manufacturers with endless headaches if they want to provide a board that allows one keypress access to the various punctuation marks.

As I understand it, Sinclair themselves had to resort to special arms within the Spectrum + that physically depress different parts of the membrane to obtain the extra keys such as the semi-colon. On first opening the box of the *Saga 1*, I dared to hope that someone else had finally come up a mechanism for doing the same as most of the punctuation marks are represented on their own as well as selected functions such as *Edit* and *Delete* that can only be accessed using the shift keys. Disappointingly the system they have used in fact only comes halfway to providing these features as they are no more than relabelled copies of the original key and return the unshifted signal when pressed alone.

The idea is that it is easier to spot and use the most common functions and Saga have provided no less than two cap shifts and four (count them) symbol shifts at useful points all over the board. After some practice you realise that this is a good compromise and makes the use of the keyboad faster and more pleasant. Keys also exist for the unshifted functions *Run*, *Load*, *List*, *Save* and *Cls*. Here are also extra cursors in some extremely sensible positions on the board which unlike the Spectrum +, return the numbers 5-8 when unshifted so they will be fully compatible with all existing software.

Some aspects of the design are irritating. The colour coding on the keys is inconsistent, with symbol shifted functions being represented in various places in black, red and green. This is not made easier by the fact that the various keywords on the main Qwerty area are very hard to read, being much smaller than on the original Spectrum which uses the area above and below the keys to carry a lot of information.

Perhaps to allow all the various interfaces to be connected the bottom of the Spectrum board is actually screwed on beneath the *Saga*, a system that works much better than I expected even though it does leave a gaping hole around the edge connector. However this does mean that four rubber feet provided at the bottom of the new board never actually touch the ground. I also found the key layout a bit unbalanced with almost all the new keys bunched on the left hand side. This is something you soon get used to.

Assembly of the new board is as simple as the blurb claims, involving only the removal of five screws and the two ribbon connectors of the Spectrum board and replacing them with about eight new screws, the new ribbons and a small clip on interface. However, the whole system is let down by very poor documentation, which only makes sense once you have figured out for yourself how the thing must go together. It is also complicated by the inclusion of a few extra mystery screws and clips which I assume are for the other Saga peripherals such as a sound amplifier that fits inside the case.

However, these are only minor criticisms and they shouldn't put you off. On the contrary, this is not only the most elegantly designed and styled add-on board for the Spectrum yet, but it is also firmly constructed and an absolute joy to use.

The keys themselves have a very positive feel and the layout is on the whole very good with a nice big space bar and two large Enter keys. I think it knocks spots off the competition.

Tony Kendle

Professional

Hardware *Datafax Disc Interface* **Micro** Sinclair Spectrum **Price** £86.25 **Supplier** Statacom Distribution Ltd, 18 Grove Road, Sutton, Surrey

Some months back it seemed as if a whole bunch of disc interfaces were about to be launched for the Sinclair Spectrum. Very few of them actually saw the light of day, partly because of microdrives and partly because the Spectrum was not designed around a disc operating system.

The Datafax interface, consisting of a strongly built and quite long black box, is the latest attempt to get around this problem. Designed initially to run with a single 3-inch Hitachi-based drive (available from the same distributors for around £300, although ask them about an all-in-one price) the interface can be used with 3, 3.5, and 5.25 inch drives. A very simple operating system has been developed which allows you to load and save programs, data-arrays, and machine code. The only other facilities provided are to format new discs, to list a disc directory, to erase a saved file, and to make a backup copy of a whole disc.

By keeping the system this simple, the Datafax designers have managed to produce a very useable device which offers high-speed and high reliability loading and saving without the need to learn a complex new way of using your computer. The interface offers a total capacity of just over 100k per disc side, although work is in hand to operate two drives and to increase the storage per drive. This 100k can be divided between up to 39 separate files.

But what about compatibility with existing hardware and software? In principle all hardware is compatible although this is achieved by the simple expedient of providing a hardware switch to control the expansion port provided. Thus you can switch between, say, joysticks and disc, but you cannot have them both on at once. Most software can also be used, including programs which use nearly all the normal Spectrum memory. This is because the interface permits its own software (which normally uses some of the free Ram) to be overwritten. A special loading procedure allows you to pack in the largest of programs, although you lose the screen display in the process.

John Cochrane


MATCH DAY
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bar the ball returns
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above the
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Spectrum

Moving into reverse

An equation converter written for any Spectrum by **Richard Armstrong**

One of the biggest difficulties in using a language like Forth or Assembly language is that expressions like *A*B+C=D* have to be written as *AB*C+D=*. This is known as Reverse Polish Notation. Converting to Reverse Polish (or as it is sometimes known, Postfix) Notation can be difficult, especially if dealing with large expressions. Fortunately, an algorithm produced by a famous computer scientist called Edsger Dykstra can do the conversion for us. This program is based on that algorithm.

The program is simple to use. Firstly the user is prompted to input the expression he wishes to be translated. The computer then prints out the corresponding Postfix expression. The program can handle the following operators +,-,*,/,=,(,),Or,And. Operands are represented by the capital letters A to Z.

As an example, the expression *A=B And C/D=E* would be translated to *AB=CD/E=And*. Note that *And* and *Or* should be entered direct from the keyboard, and not spelled out one letter at a time. When the prompt *More? (Y/N)* appears, the user should press *Y* to translate more expressions or *N* to end the program.

The program works by considering each element of *A$* in turn. If the element under consideration is an operand (A...Z) then it is printed. If the element is an operator (=,*,etc) then its priority must be considered. And, * and / have the highest priority, 'Or' '+' and '-' are the next, '=' being the last. Brackets raise the priority of what is between them.

If the element of *A$* is an operator, then operators are removed from the stack and printed until the stack is empty or there is a left hand bracket on top of the stack, or (finally) the operator on the top of the stack has a lower priority than the element of *A$* under consideration. The element being considered is then added to the stack. If the element being considered is a left hand bracket, then this is likewise added to the stack. If, however, the element of *A$* is a right hand bracket, then the operators are removed from the stack and printed until a left hand bracket is found.

Program Notes

Line No	
10-90	Print instructions and read expression to be translated
130-180	Loop to scan the input expression and call appropriate sub-routines
190-210	A routine to empty the stack
220-270	Decide if more expressions are to be converted
310-360	Print items from the stack until a left hand bracket is found
400-420	Drop an operator from the stack
430-450	Add the operator under consideration to the stack
490-580	Considers the priority of the operator under consideration and prints operators or adds operators to the stack as appropriate

Variables

A$ —	Expression input for translation
S$ —	A 'stack' used to store operators
SP —	A 'stack pointer' used to keep track of the end of the stack
A —	Loop control variable

```
  10 REM INFIX TO R.P.N.
  20 LET S$=""
  30 LET SP=0
  33 PRINT "   INFIX TO POSTFIX C
ONVERSION"
  36 PRINT
  40 PRINT "INPUT YOUR EXPRESSIO
N AND I WILLCONVERT IT TO REVERS
E POLISH   NOTATION. REMEMBER T
O ENTER 'OR'& AND  AS SINGLE KE
YWORDS."
  50 INPUT A$
  60 PRINT A$
  70 PRINT
  80 PRINT "IS EQUIVALENT TO-"
  90 PRINT
 100 REM ************************
 110 REM SCAN INPUT EXPRESSION
 120 REM ************************
 130 FOR A=1 TO LEN A$
 140 IF A$(A)>="A" AND A$(A)<="Z
" THEN PRINT A$(A);
 150 IF A$(A)="=" OR A$(A)="+" O
R A$(A)="-" OR A$(A)="*" OR A$(A
)="/" OR A$(A)=" AND " OR A$(A)=
" OR " THEN GO SUB 490
 160 IF A$(A)="(" THEN GO SUB 43
0
 170 IF A$(A)=")" THEN GO SUB 31
0
 180 NEXT A
 190 FOR A=LEN S$ TO 1 STEP -1
 200 PRINT S$(A);
 210 NEXT A
 220 PRINT
 230 PRINT
 240 PRINT "MORE ? (Y/N)"
 250 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 250
 260 IF INKEY$="N" THEN STOP
 270 RUN
 280 REM ************************
 290 REM PRINT ITEMS FROM STACK
 300 REM ************************
 310 IF SP=0 THEN RETURN
 320 IF S$(SP)="(" THEN GO TO 40
0
 330 PRINT S$(SP);
 340 LET S$=S$(1 TO LEN S$-1)
 350 LET SP=SP-1
 360 GO TO 310
 370 REM ************************
 380 REM DROP TOP STACK ITEM
 390 REM ************************
 400 LET S$=S$(1 TO LEN S$-1)
 410 LET SP=SP-1
 420 RETURN
 430 LET S$=S$+A$(A)
 440 LET SP=SP+1
 450 RETURN
 460 REM ************************
 470 REM DEAL WITH AN OPERATOR
 480 REM ************************
 490 IF S$="" THEN GO TO 560
 500 IF S$(SP)="(" THEN GO TO 56
0
 510 IF ((A$(A)="*" OR A$(A)="/"
 OR A$(A)=" AND ") AND (S$(SP)="
+" OR S$(SP)="-" OR S$(SP)=" OR
" OR S$(SP)="=")) OR ((A$(A)="+"
 OR A$(A)="-" OR A$(A)=" OR ") A
ND (S$(SP)="=")) THEN GO TO 560
 520 PRINT S$(SP);
 530 LET S$=S$(1 TO LEN S$-1)
 540 LET SP=SP-1
 550 GO TO 490
 560 LET S$=S$+A$(A)
 570 LET SP=SP+1
 580 RETURN
```


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*A useful filing program for Dragon 32 users written by **W Patton***

This is a program that allows you write your own filing system and have as many fields to a file as you want It takes up 1 5K of memory and can store up to 300 entries.

The program is split up into several sections, Line 10 prints out the menu, Lines 20 and 30 get your command to go to the corresponding section of the program Lines 40 90 are used by Option 1 where you are requested to type in the number of fields that the file you are creating requires You then type in each entry, pressing *Enter* after each field has been typed in When you want to finish typing, you must type *XX* as the first entry to your last file

Lines 100-110 are used by Option 2 These allow you to add more files to the end of your file You enter data for this the same way as for Option 1 using 'XX' to return to the menu

Line 120 is used by Option 3 and can be used to correct any mistakes made while entering your data. You are required to first state the file that the error is in, then the field You then type in the new item and it will replace the old one

Lines 130 and 140 are used by Option 4 This allows you to insert a file anywhere in the large file You must type in the number at which you want the file to go in at, then you must type in the new file Line 150 is used by Option 5 You must type in the number of the file that is to be deleted then that file will be erased.

Line 160 is used by Option 6 where the file is saved. You have to type in the name you want to call the file After pressing *Enter* you are given a pause in which time you should press play and record on your cassette recorder Line 170 is used by Option 7, the loading routine You have to type in the name of the file to be loaded. When the file has loaded you return back to the menu.

Lines 180-200 are used by Option 8 the print out routine You are first asked if you wish it to go to the screen or the printer Press any key to step through the file When all the file is printed out the program waits for you to press *Enter* before returning to the menu. Lines 210-230 are used by Option 9, where a word is searched for in the file You just type in the word you are looking for in full, and the computer will search through the large file until it finds it

Variables

A	= Number of fields
Array A$	= All of the file
EO	= Length of file + 1 in memory
X$	= General input
A1	= Value of key pressed
F/X	= For next loop variables
N$	= Name of file to load or save
D	= General input

```
5 CLEAR 10000
10 CLS PRINT"(1) START A NEW FILE" PRINT"(2) A
DD TO A FILE" PRINT"(3) EDIT A FILE" PRINT"(4)
 INSERT A FILE" PRINT"(5) DELETE A FILE" PRINT
"(6) SAVE FILE" PRINT"(7) LOAD A FILE" PRINT"(
8) PRINT OUT FILE" PRINT"(9) SEARCH FOR A WORD
" PRINT"COMMAND"
20 X$=INKEY$ IF X$="" THEN 20 ELSE A1=VAL(X$)
IF A1<1 OR A1>9 THEN GOTO 10
30 ON A1 GOTO 40,100,120,130,150,160,170,180,2
10
40 CLEAR INPUT"HOW MANY FIELDS",A.IF A<0 OR A>
11 THEN 40 ELSE DIM A$(300,A)
50 PRINT"TYPE 'XX' TO END"
60 FOR F=1 TO 300 PRINT"FILE ",F FOR X=1 TO A
70 INPUT A$(F,X) NEXT X
80 IF A$(F,1)="XX" THEN EO=F GOTO 10 ELSE NEXT
 F
90 PRINT"FILE FULL" GOTO 10
100 FOR F=EO TO 300 PRINT"FILE ",F FOR X=1 TO
A
110 GOTO 70
120 INPUT"WHICH FILE",F INPUT"WHICH FIELD",X I
NPUT"TYPE IN NEW ENTRY",A$(F,X) GOTO10
130 INPUT"WHERE IS NEW FILE TO GO",D IF D>=EO
THEN GOTO 10 ELSE FOR F=EO TO D-1 STEP -1 FOR
X=1 TO A A$(F+1,X)=A$(F,X) NEXT X,F
140 EO=EO+1 PRINT"TYPE IN NEW FILE" FOR X=1 TO
 A INPUTA$(D,X) NEXT GOTO 10
150 INPUT"WHICH FILE IS TOP DELETED",D  IF D>=
EO THEN GOTO 10 ELSE FOR F=D TO EO FOR X=1 TO
A A$(F,X)=A$(F+1,X) NEXT X,F EO=EO-1 GOTO 10
160 INPUT"NAME TO SAVE FILE UNDER",N$ PRINT"PR
ESS PLAY AND RECORD" FOR F=1 TO 1000 NEXT OPEN
"O",#-1,N$ PRINT#-1,EO,A FOR F=1 TO EO FOR X=1
 TO A PRINT#-1,A$(F,X) NEXT X,F CLOSE#-1 GOTO
10
170 INPUT"NAME OF FILE TO BE LOADED",N$ PRINT"
PRESS PLAY CASSETTE" OPEN"I",#-1,N$ INPUT#-1,E
O,A FOR F=1 TO EO FOR X=1 TO A.INPUT#-1,A$(F,X
) NEXT X,F CLOSE#-1 GOTO 10
180 INPUT"(S)CREEN OR (P)RINTER",X$ IF X$="P"
THEN D=-2 ELSE D=0
190 FOR F=1 TO EO-1 PRINT#D,F, FOR X=1 TO A PR
INT#D,A$(F,X)," ", NEXT
200 IF INKEY$="" THEN 200 ELSE PRINT#D NEXT IN
PUT"ENTER TO RETURN',X GOTO10
210 INPUT"TYPE IN WORD",X$ FOR F=1 TO EO FOR X
=1 TO A IF A$(F,X)=X$ THEN 230 ELSE NEXT X,F
220 PRINT"WORD IS NOT THERE" INPUT"ENTER TO RE
TURN",X GOTO10
230 PRINTF, FOR X=1 TO A PRINTA$(F,X)," ", NEX
TX PRINT INPUT"PRESS ENTER TO RETURN",X.GOTO10
```


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In the parallel universe

Perfect Parallel Printing on the Commodore 64 courtesy of **Adrien Warman**

As many users of Commodore equipment will be aware, little provision is made for those who wish to use non-standard equipment, such as Centronics-equipped printers. A growth market for CBM users is the Parallel Printer interface package, which can range from cheap cable and minimal software, up to expensive hardware add-ons that do everything and cost a corresponding amount.

A typical software interface will come with a short cable to connect from the User Port to the Centronics Printer and a small piece of machine code software. This software will usually reside in the spare Ram from *$C000* to *$CFFF*, since this is untouched by Basic. Modifications are made to the Kernal vectors so that any attempt to access a given device number (say six) will re-directed out of the User Port as a parallel *Ascii* code.

Unfortunately, another growth market, extending the Basic on the CBM 64, also tends to produce packages which *also* use the *$C000* Ram. Such a package is the Simons' Basic cartridge which uses the Ram for a variety of purposes including Function Key definition. This means that if you want to have a worthwhile language you may well be unable to use your Parallel Interface Program.

This article lists and describes a reasonably short Basic package which will drive a parallel interface as long as you have a suitable connecting cable. The routines are detailed, and could be easily converted for use under other languages. For example, the extremely comprehensive Pascal Compiler from Oxford Computer Systems does not support parallel printers, so using the listed routines it is an easy job to define suitable procedures in Pascal to perform all necessary tasks.

The routines supplied are a little slower than machine code equivalents, and they do not check to ensure that the device is present and connected, however, they don't require any of the file channels, leaving them all free for other purposes.

The package consists of three subroutines. One is used to configure the CBM Input/Output chips to control the data lines. The next is used to place an *Ascii* character onto the data lines (and hence send it to any listening device). It will then wait for an acknowledgement that the character has been received. The last routine will restore the CBM I/O chips to prevent the parallel device being accessed further.

As an example of the routines used, a short program is added to the front of the listing which prints out the *Ascii* characters from number 32 to number 127 inclusive.

Program notes

Line 140 This line calls the subroutine which will perform the equivalent of Basic 'OPEN' instruction. Since no 'file' is being used, no file number needs to be given.

Line 150 This is the start of the loop to print out the ASCII characters from 32 to 127 inclusive.

Line 160 The subroutine to output characters assumes that the ASCII code is stored in variable *CHAR*. If you wanted to use literal characters you could use something like *Char = Asc ("a")*.

Line 170 This line calls the subroutine which will perform the equivalent of a Basic *Print#x, Chr$(y)* instruction. Note that (as stated above) no file is used, and so no file number is required. In addition the semicolon after the print instruction is always implied. Thus to simulate a

continued on page 51

```
100 REM BASIC PARALLEL PRINTER
ROUTINES.
110 :
120 REM BY A.WARMAN
130 :
140 GDSUB 60010
150 FDR X=32 TD 127
160 CHAR=X
170 GDSUB 60190
180 NEXT X
190 CHAR=13
200 GDSUB 60190
210 BDSUB 60110
220 STOP
230 :
60000 REM OPEN TD PRINTER.
60010 CIA2=56576
60020 PDKE CIA2+3,255
60030 PDKE CIA2+1,0
60040 PDKE CIA+2,PEEK(CIA2+2) DR 4
60050 PDKE CIA,PEEK(CIA2) OR 4
60060 PDKE CIA2+13,16
60070 RETURN
60080 :
60090 :
60100 REM CLOSE ACCESS TD PRINTER.
60110 CIA2=56576
60120 POKE CIA2+13,0
60130 PDKE CIA2+3,0
60140 POKE CIA2+2,PEEK(CIA2+2)
AND 251
60150 RETURN
60160 :
60170 :
60180 REM PRINT DUT CHARACTER
'CHAR'.
60190 CIA2=56576
60200 PDKE 49152,PEEK(CIA2+13)
60210 POKE CIA2+1,CHAR
60220 POKE CIA2,PEEK(CIA2) AND 251
60230 POKE CIA2,PEEK(CIA2) DR 4
60240 IF (PEEK(CIA2+13) AND 16)=0
THEN GOTD 60240
60250 RETURN
```



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Print#x instruction (which would simply print a carriage return), you should use *Char = 13:Gosub 60100*

Line 180 Go and do the next character (if there is one to do)

Lines 190-200 Output an *Ascii* carriage return <CR> character. This corresponds to the *Print#x* as described above, and on most parallel printers ensures that any text left in the input buffer will be printed.

Line 210 This line calls the subroutine which will prevent the I/O chips from trying to access any parallel devices on the User Port by restoring default values.

Line 220 Halt the demonstration program.

Lines 60010 – 30 These lines are responsible for configuring the I/O chips to access the User Port in a manner suitable for controlling a parallel Centronics device. In its absolute minimum configuration, a parallel Centronics port requires eight data lines (called a 'bus') a *strobe* line to show the parallel device when the data on the bus is valid, and an *acknlg* line to show when the parallel device has accepted the data. The 8-bit bus is set up using Port B of *CIA#2*, which connects directly to the User Port (program lines 60020-60030). The *strobe* line is bit two of Port A (program lines 60040-60050). Finally the *acknlg* line is set up using the *Flag* interrupt on *CIA#2* (program line 60060).

Lines 60010 – 140 These lines deselect the I/O chips to prevent them accessing the parallel device. The *acknlg* line is disabled as that is can no longer be read (program line 60120). Each of the 8 lines on the data bus is restored to an input line (program line 60130). Finally the *strobe* line is redefined as an input line (program line 60180).

Lines 60100 – 250 The key lines of the package. First, a read of the *acknlg* line must be made in order to check it later (program line 60200) — for the reason, see the Programmers Reference Guide. Note that the data returned is placed in location 49152 simple for convenience! If you wish, you could replace program line 60200 with (say) *Let A = Peek (CIA2+13)*.

Next, the actual *Ascii* code is placed on the data bus (program line 60210). The *strobe* line is switched to show data ready (lines 60220-60230). Since the device may have a delay (such as moving the print head back to the next line), the program must wait for an acknowledgement via the *acknlg* line (program line 60240). Once this has been completed, the character has been sent and received, so we can exit the routine.

Hopefully, you should now see how to modify your own programs in order to incorporate the parallel interface routines. However, this does *not* get over the fact that a connecting cable is still required. Fortunately, these are available as stand-alone items from advertisers in magazines such as this esteemed paper!

Competition result

Flight Competition winner

The winner of the Flight Simulation Competition we ran in the September 6 issue is Simon Watson aged 19, from Harlow in Essex.

Last week he was awarded the prize — a chance to fly a real flight simulator used to train commercial airline pilots at British Airways Cranebrook training centre at Heathrow airport.



British Airways operates three flight simulators at Cranebrook, each of which stands about 40 feet tall and costs a staggering £10m apiece. The machine which Simon spent around two hours flying was a Boeing 757 simulator — a faithful reconstruction of the 757's cockpit supported twenty feet above the ground on powerful hydraulic rams. These are controlled by two Vax minicomputers to move the cockpit according to the pilot's commands to accurately reproduce the effects of take-off and landing. The illusion is completed with four monitors suspended above the cockpit windows, projecting a high-resolution computer-generated picture of the runway, surrounding buildings, roads and skyline.

It was something of a surprise to discover that Simon already has some flying experience. He hopes to make flying his career and as a first step he



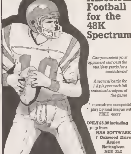
is trying get private pilot's licence allowing him to fly light aircraft. Even though he has done some flying he has never tried to learn to drive — he says he couldn't afford to do both.

After his two-hour 'flight' he persuaded British Airways Boeing Training Captain, Roger Benham, to log the simulator 'familiarisation' in his flight record.

Now Simon is looking for a sponsor so that he can continue with his ambition to become a commercial helicopter pilot.



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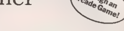


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Games Designer

Competition



Think you can design an arcade game? This is your chance to put all those great ideas into practice. We want you to design the sequel to Elite's *Kokotoni Wilf*.

Kokotoni Wilf from Elite Software — one of this Autumn's top selling games on both the Commodore 64 and the Spectrum is to have a sequel. The plot? — that's for you to decide!

Popular Computing Weekly offers you the chance to use your own ideas, characters, plot and so on to create the sequel to *Kokotoni Wilf* which will be published by Elite in the new year.

The winner(s) will be credited with the storyline design in all advertising and promotion, and the winner(s) name(s) will be featured in the packaging in addition, a royalty of 6% of sales achieved will be paid to the winning designer or design team.

It is important to remember that the program you create is to be a sequel and so, in a general way, you should maintain the theme and atmosphere of the original. For anyone not familiar with *Kokotoni Wilf* here is the story so far:

"Legend has it that many hundreds of years ago somewhere in Northern Europe lived a great Magician known as Ulrich. Ulrich knew of a magic amulet, fragments of which had been scattered throughout time. Ulrich wished to wield its power, but he was too old and infirm for such an arduous adventure and so charged his protege Kokotoni Wilf with the epic task. Ulrich sent Wilf back in time to the age of the great dinosaurs there to begin his quest through the ages for each fragment of the Amulet. Ulrich has provided Wilf with magic wings and time gates to pass from age to age — your task is to guide Wilf in his epic quest."

What we want you to do

The competition is open to both individual designers or design teams. You are not asked to actually program the game. All you have to do is to prepare a storyboard — a series of screen drawings or sketches — for the sequel which should explain the action from the first screen to the last.

The finished storyboard should be detailed enough for Elite's programmers and designers to use without any major changes — set yourself a limit of no less that 20 screens of action and no more than 60. It might be helpful to divide your storyboard into two sections, a general guide to the story including overall objectives and method of scoring etc (limit yourself to a maximum of 800 words). The second section should be much more specific detailing exactly what is going on where in each screen, indicating such things as sprites, background layout and movement paths. To help you, we show on the right one such storyboard from a screen in the first *Kokotoni Wilf* program.

How to enter

Completed storylines and storyboards should be submitted to Kokotoni Wilf Competition, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP, to arrive no later than 1 January 1985.

All entrants requiring an acknowledgement of receipt should submit a stamped self-addressed envelope. Entrants requiring their work to be returned after judging should send a suitable post paid self-addressed envelope with the entry.

The judges decision will be final. Don't forget to include your name and address! Ten runners up will receive copies of the game which will be produced for the Spectrum and Commodore 64.

SPECTRUM SCREEN DISPLAY

32 CHARACTERS

24 CHARACTERS

PLAY AREA

A B C D E F G H I

EXIT

EXIT

SCORE AREA

elite

TIME ZONE 3 SCREEN 1

A STARTING POSITION OF KOKOTONI WILF
B STARTING POSITION OF 'BOOK' SPRITE
C STARTING POSITION OF 'BOILING POT' SPRITE
D ANIMATED 'FIRE' SPRITE
E LOCATION OF AMULET FRAGMENT
F, G, H, I SKULL SHELF, POTS SHELF, OPEN RANGE, SKELETON

BOLD ARROWS SHOW SPRITE MOVEMENT PATTERNS
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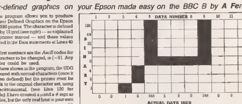
Reform your character

User-defined graphics on your Epson made easy on the BBC B by ***A Fennell***

This program allows you to produce User Defined Graphics on the Epson FX80 printer. The character is defined on an 8 by 12 grid (see right) — as explained in the printer manual — and these values are stored in the Data statements at Lines 40 & 50.

The first numbers are the *AscII* codes for the characters to be changed, ie [=91. Any character could be used.

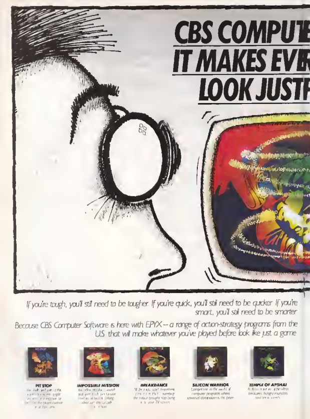
As I have shown in the program, the UDG can be used with normal characters (once it has been defined) but the printer must be set back to the original character set, using *Procbacktonormal*, (see Line 120 for example). I have created a μ and a # sign as examples, but the only real limit is your own inventiveness.




```
10  REM program to produce UDG on the  FX-80 printer.see page 3-38
        of manual.produces a mu sign   VDU2 enables the printer
        VDU3 disables the printer      VDU1 sends next character to
20  REM      the printer only
30  VDU 2
40  DATA 64,0,0,1,6,248,8,8,8,248,0,0,0:REM @ => MU ON PRINTER
50  DATA 91,0,36,126,126,36,126,126,36,0,0,0,0:REM [ => £ ON PRINTER
60  PROCCREATECHARACTER
70  PROCCREATECHARACTER
80  VDU 3
90  VDU 2
100 PRINT "@@@@[[[["
110 PROCBACKTONORMAL
120  PRINT:PRINT "WE CAN ALSO USE THE CHARACTER ";:RESTORE
40:PROCCREATECHARACTER:PRINT "@";:PROCBACKTONORMAL:PRINT" IN A SENTENCE"
130  VDU 3
140  STOP
150  DEF PROCCREATECHARACTER
160  REM
170  REM PRINT CHR$(27);"&";CHR$(0);CHR$(£);CHR$(£);
180  REM READ IN THE ASCII VALUE OF THE NEW CHARACTER
190  READ A
200   VDU 1,27:VDU 1,38:VDU 1,0:VDU 1,A:VDU 1,A
210  REM
220  REM PRINT CHR$(139);
230  VDU 1,139
240  REM
250  REM DEFINE THE 8*12 SHAPE FOR THE CHARACTER
260  FOR I=1 TO 12:READ A:VDU 1,A:NEXT
270  REM
280  REM PRINT CHR$(27);"%";CHR$(1);CHR$(0)
290  VDU 1,27:VDU 1,37:VDU 1,1:VDU 1,0
300  ENDPROC
310  DEF PROCBACKTONORMAL
320   REM return printer characters to normal
330  VDU 1,27:VDU 1,37:VDU 1,0:VDU 1,0
340  ENDPROC
```



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Routine input

For easier inputting and editing of your data a program from M J Amess

This program consists of one major procedure, called *Cinput*, which provides a convenient method for accepting data from the user's terminal. It provides a number of data formats to allow almost any type of data to be entered and checked for validity.

This routine can reside at the end of your own programs and be called whenever data input is required. It is called by typing *Cinput* and is followed by a list of formal parameters, which will supply data for the procedure. To see what formal parameters are used look at Line 30020 which defines the procedure. The parameters used are, *Row, Col, Max, Min, Types, Old Ink, Old Paper*. *Row* and *Col* define the screen coordinates at which the data is to be accepted. *Max* and *Min* are used to define the maximum and minimum number of characters that are to be accepted by the procedure.

The *Cinput* procedure types periods ( ) at the specified screen position to show the user the maximum number of characters allowed (taken from the value entered in the *Max* variable). In case of an error whilst entering data, messages are displayed in Screen #0.

The most important parameter that must be entered is *Types*. This is a one or two character string defining the type of data to be entered. There are eight main types which are:

1) 'D' = Enter a date, in the format DDMMYY. This is edited for a valid Day and Month and redisplayed in DD/MM/YY format.

2) 'A' = Alphanumeric. All characters are valid.

3) 'In' = Enter any positive integer numeric.

4) 'N' = Accept any positive numeric and display it in a monetary form. The numeric is entered without a decimal point. For example, if 10021 is entered this is automatically redisplayed as 100.21.

5) 'NN' = Negative numeric. This is exactly the same as the 'N' type except that the numeric entered is changed to a negative. The user enters the numeric as a positive and the computer redisplays the value as a negative.

6) 'Y' = Acept Yes/No or Esc. The computer will await the user to press either the 'Y', 'N' or 'Esc' keys. Pushing the 'Enter' key will have the same effect as pushing the 'Y' key.

7) 'P' = Accepts an alphanumeric password. This type uses the *Old Ink* and *Old Paper* variables so that any typed data is not displayed in a visible form on the screen. These two variables must be set to the current *Ink* and *Paper* values that are being used.

8) 'V' = Verification — accepts only a carriage return (enter key).

All data which is entered is stored in the variable *Entry$*, even numeric data, which can be stored later in a numeric variable.

One final facility is that instead of entering the expected data you may enter *End* (or push the Esc key in the 'Y' option). This sets a variable, *Inxctl*, to 3 which could signify that the user wishes to escape from a particular option within his/her program. During normal use *Inxctl* will be set to zero if the procedure is completed Ok. If 'Y' is pushed in the *Yes/No* field then *Inxctl* is set to 1, or if 'N' is pushed then *Inxctl* will equal 2.

The following is an example of the *Cinput* procedure. Type, *Cinput* 10,5,20,5,'A'

This will accept any alphanumeric data at position 10 5 on the terminal. The maximum number of characters that will be accepted is 20 and the minimum is 5. Please note that the *Ink* and *Paper* variables need only be entered when using the password option.

```
30000 REMark ENHANCED INPUT ROUTINE
30005 REMark COPYRIGHT 1984 M.J.AMESS
30010 REMark VERSION RS1.00 19/08/84
30015 REMark ** #5
30020 DEFine PROCedure CINPUT(ROW,COL,MAX,MIN,TYPE$,OLD_INK,OLD_PAPER)
30025 INXCTL=0:CLS #0
30030 IF TYPE$="D" THEN DATE_ENTER
30035 IF TYPE$="A" THEN ALPHA
30040 IF TYPE$="N" OR TYPE$="NN" OR TYPE$="IN"
THEN NUMERIC
30045 IF TYPE$="Y" THEN YES_NO
30050 IF TYPE$="P" THEN PASSWORD
30055 IF TYPE$="V" THEN VERIFY
30060 END DEFine CINPUT
30065 REMark ********* ENTER DATE *********
30070 DEFine PROCedure DATE_ENTER
30075 MIN=6:MAX=6
30080 REPeat LOOP
30085 ENTER_VALUE
30090 IF INXCTL=3 THEN EXIT LOOP
30095 SET=0
30100 MAX=6:MIN=6:CHK_LENGTH:IF SET THEN GO
TO 30095
30105 MONTHS=ENTRY$(3 TO 4):YEAR$=ENTRY$(5
TO 6)
30110 DTE$=ENTRY$(1 TO 2)
30115 IF MONTHS < 1 OR MONTHS > 12 THEN SET=1
30120 IF DTE$ > 31 OR DTE$ < 1 THEN SET=1
30125 IF DTE$ > 29 AND MONTHS=2 THEN SET=1
30130 IF MONTHS=4 OR MONTHS=6 OR MONTHS=9 OR
MONTHS=11 THEN
30135 IF DTE$=31 THEN SET=1
30140 END IF
30145 IF NOT SET THEN EXIT LOOP
30150 END REPeat LOOP
30155 IF INXCTL<>3 THEN
30160 AT ROW,COL:PRINT DTE$;"/";MONTHS;"/";
YEAR$
30165 END IF
30170 END DEFine DATE_ENTER
30175 REMark ********* ENTER AN ALPHANUMERIC
*********
30180 DEFine PROCedure ALPHA
30185 REPeat LOOP
30190 ENTER_VALUE
30195 IF INXCTL=3 THEN EXIT LOOP
30200 SET=0:CHK_LENGTH
30205 IF NOT SET THEN EXIT LOOP
30210 END REPeat LOOP
30215 END DEFine ALPHA
30220 REMark ********* ENTER NUMERIC *********
30225 DEFine PROCedure NUMERIC
30230 REPeat LOOP
30235 ENTER_VALUE
30240 IF INXCTL=3 THEN EXIT LOOP
30245 SET=0:CHK_LENGTH
30250 IF SET THEN GO TO 30235
30255 SET=0
30260 FOR VALUE=1 TO LEN(ENTRY$)
30265 IF CODE(ENTRY$(VALUE)) < 48 OR CODE(ENT
RY$(VALUE)) > 57 THEN SET=1
30270 END FOR VALUE
30275 IF SET THEN GO TO 30315
30280 IF TYPE$="IN" THEN GO TO 30315
30285 IF LEN(ENTRY$)=2 THEN ENTRY$="0" &
ENTRY$:GO TO 30295
30290 IF LEN(ENTRY$)=1 THEN ENTRY$="00" &
ENTRY$
30295 LINE$=ENTRY$(1 TO (LEN(ENTRY$)-2))
30300 LINE$=LINE$ & ".":LINE$=LINE$ & ENTRY$(
LEN(ENTRY$)-1 TO LEN(ENTRY$))
30305 ENTRY$=LINE$
30310 AT ROW,COL:CLS #1,4:PRINT ENTRY$
30315 IF NOT SET THEN EXIT LOOP
```

```
30320 END REPeat LOOP
30325 IF TYPE$="N" THEN
30330 ENTRY$='-' & ENTRY$
30335 AT ROW,COL: CLS #1,4: PRINT ENTRY$
30340 END IF
30345 END DEFine NUMERIC
30350 REMark ######### SELECT "Y','N' OR ESC
#########
30355 DEFine PROCedure YES_NO
30360 MIN=1: MAX=1
30365 REPeat FIND_LOOP
30370 DOT: PRINT "?" AT ROW,COL
30375 A=CODE(INKEY$(-1))
30380 IF A=78 OR A=89 OR A=27 OR A=10 THEN EXIT
FIND_LOOP
30385 END REPeat FIND_LOOP
30390 IF A=27 THEN AT ROW,COL: PRINT "ESC"
INXCTL=3
30395 IF A = 78 THEN INXCTL=2: AT ROW,COL: PRINT
"N"
30400 IF A=89 OR A=10 THEN INXCTL=1
30405 END DEFine YES_NO
30410 REMark ######### ENTER PASSWORD #########
30415 DEFine PROCedure PASSWORD
30420 INK OLD_PAPER
30425 REPeat LOOP
30430 ENTER_VALUE
30435 IF INXCTL=3 THEN EXIT LOOP
30440 SET=0: CHK_LENGTH
30445 IF NOT SET THEN EXIT LOOP
30450 END REPeat LOOP
30455 INK OLD_INK: PAPER 4
30460 END DEFine PASSWORD
30470 DEFine PROCedure VERIFY
30475 MAX=8: MIN=8
30480 REPeat LOOP
30485 SET=0
30490 ENTER_VALUE
30495 CHK_LENGTH: IF NOT SET THEN EXIT LOOP
30500 END REPeat LOOP
30505 END DEFine VERIFY
30510 STOP
30515 DEFine PROCedure DOT
30520 AT ROW,COL: CLS #1,4
30525 IF TYPE$="P" THEN INK OLD_INK
30530 PRINT (FILL$('.',MAX))
30535 AT ROW,COL
30540 IF TYPE$='P' THEN INK OLD_PAPER
30545 END DEFine DOT
30550 DEFine PROCedure ENTER_VALUE
30555 AT ROW,COL: CLS #1,4
30560 DOT: INPUT ENTRY$
30565 IF ENTRY$="" THEN RETurn
30570 IF ENTRY$(1 TO 3)="END" AND LEN(ENTRY$)=3
THEN INXCTL=3
30575 END DEFine ENTER
30580 DEFine PROCedure CHK_LENGTH
30585 IF LEN(ENTRY$)>MAX THEN
30590 INPUT #0,"ENTRY TOO LONG - CR TO CONT
INUE";A$: CLS #0: SET=1
30595 END IF
30600 IF LEN(ENTRY$)<MIN THEN
30605 INPUT #0," ENTRY TOO SHORT - CR TO CON
TINUE";A$: CLS #0: SET=1
30610 END IF
30615 END DEFine CHK_LENGTH
```

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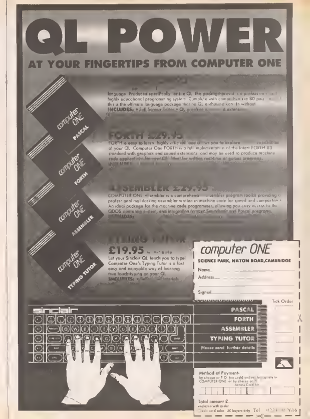
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Inside Arnold

Take a peek inside the depths of the Amstrad Rom with **Colin Harris** *from Nemesis Software*

It is interesting to note that although the CPC 464 has been readily available since July, the reports of 'bugs' have been very few. Indeed the only mention I recall is the absence of an explanation of the operator *'Mod'* in the Handbook, but that doesn't really count. The traditional welcome to a new computer is the 'bug' report. Is the absence of these some kind of dubious acolade for the Amstrad? Notably however, there has been more than one complaint that owners are unable to nose through the Operating System, more simply the Rom.

The Rom in the CPC464 is split into two sections. One section of 16K occupies addresses 0-3FFF(HEX) — almost, anyway. The upper Rom occupies C000 FFFF(HEX), and in doing so overlays the screen Ram. The lower Rom overlays part of the user Ram. This arrangement with clever switching releases the maximum possible area to user Ram during Basic operations. It is because of this that the Rom seems to be inaccessible to the Basic user. There is a one line program for the Dragon to produce a Hex or Character Dump of the Rom. No such simple method will work with the Amstrad.

In complete contrast to other computer manufacturers, Amstrad have made a wealth of information available to the user. *The Complete Rom Disassembly of Micro X* is often the eagerly awaited independent publication — appearing long after the introduction of the computer. Amstrad's *The Complete Firmware Specification (Ref Soft 158)* was available, in theory at least, from day one. This publication fully explains all the routines in the Rom that one could possibly want to use, and more! In here are the routines that will enable the Assembler Programmer to solve the problem. Obviously enough if you have a halfway decent Assembler package you will not need a program to produce a Hex or Character dump: the Assembler/Disassembler probably has it built-in. In any case a Disassembly of the Rom is of much greater value.

Nevertheless to assemble this program gives one useful experience of the Amstrad's Rom routines and thus of course leads to a Basic program to enter the code. Listing B is the assembly list. Listing A is the program for those without an assembler.

Listing A — The Basic Program

Type in the Basic program exactly as listed, paying special attention to the Hex numbers. The letters a to f which are used in the hex system are shown in lower case, as this way one is less likely to confuse B with 8, etc.

Having entered it make a copy on tape before running it. If all is well the program will *Poke* the code into reserved Ram, and the screen will invite you to *Call* the program. If you have made an error in entering the data, you will have to check it and rectify the error. Check first that each data statement (the last has 11 only) contains 32 sets of hex numbers. When you have located your error(s) re-save the program and try again. Now see the notes on using the program. The machine code program can now be saved to tape by: *Save "HILO-ROM" B 41856 971, 42001.*

Call 42001 executes the program. Define a key to do this as in Line 30 of the Basic program.

Program Notes

Line 20 sets Ramtop

Line 30 defines the numeric keypad dot to call the machine-code program

Lines 40-70 convert the hex numbers read from data to a form that is poked into the reserved Ram. Also a checksum is generated to virtually ensure that only a correct entry is offered to run.

Line 100 holds the message from Line 90 on the screen for long enough to be read, then the Basic program self-destructs, leaving the machine-code in reserved memory

```
5 LOADER FOR HIROM/LOROM [illegible] 1984
10 [illegible]
20 MEMORY [illegible]
30 CLS:KEY [illegible]
40 FOR [illegible]
50 [illegible] POKE
60 [illegible]
70 NEXT [illegible]
80 IF [illegible]
90 PRINT HIROM_LOROM [illegible] PRINT:PRINT PRESS [illegible]
100 FOR [illegible]
110 DATA [illegible]
120 DATA [illegible]
130 DATA [illegible]
140 DATA [illegible]
150 DATA [illegible]
160 DATA [illegible]
170 DATA [illegible]
180 DATA [illegible]
190 DATA [illegible]
200 DATA [illegible]
210 DATA [illegible]
```

Lines 110 to **410** contain the data representing the machine code

Listing 8 — the Assembler Listing
The assembly listing was not written to be a model of assembly programming, nor to be the most efficient method or even a structured method. It was written to investigate the use of Rom routines and as such it is worth examination. It undoubtedly will extend to a full blown monitor. If you attempt this you will discover that the *Concise Firmware Specification* has everything you need.

Program Notes
Lines 5-250 define the text for a simple menu and label some Rom routines for the program proper. **Lines 260-880** place menu to screen using colours and pass to Line 1000 *(Holdup)*. *Holdup* awaits input and then passes control to the appropriate routine. You should be able to follow from there the routines for outputting the hex-dump and character dump. Note the highlighting of *Ascii*-characters in the dump by use of colour changes. The Rom routines used (with their official names) are:

#BB5A Txt Output —	Outputs a character or control code to the text VDU.
#BB18 Km Wait Key —	Waits for next key from the keyboard.
#BB1B Km Read Key —	As #BB18 but doesn't wait.
#BB90 Txt Set Pen —	Set ink for writing colours.
#B900 KL U Rom Enable —	Turn on the Upper Rom.
#B903 KL U Rom Disable —	Turn off the Upper Rom.
#B906 KL Rom Enable —	Turn on the Lower Rom.
#B909 KL L Rom Disable —	Turn off the Lower Rom.
#BB75 Txt Set Cursor —	Set cursor position.
#BB7E Txt Cur Disable —	Disallow cursor display.
#BB5D Txt Wr Char —	Writes a character to the screen — control codes are printed and not obeyed.
#BB03 Km Reset —	Reset key manager, clear all buffers, restore standard key expansions and indirections.

Using the Program
When initiated the program offers a Menu. First press *Caps Lock* and then press the letter corresponding to the memory you wish to examine.

L will be in the hex and character dump of *Low Rom* from address 0 (it actually starts somewhat later) to #3FFF. It will stop at the end and return to Menu. *H* will similarly deal with the *High Rom* ending at #FFFF. *R* deals with all *Ram* up to #BFFF (the memory that follows is the default screen memory).

Enter will stop the display to allow closer inspection. Also whilst stopped you have the option to rapidly advance the memory display in increments of 256-bytes by pressing *I*. When the indicator reaches the desired address press *C* to continue. Alternately *E* will return to Basic or *Q* will return *Menu*. *Enter* will resume display and scroll.

Screen Display
From left to right the screen display consists of Hex Address, eight hex values (the first corresponds to the Hex Addr. The remainder correspond to the previous address plus 1).

These are then followed by the character represenation of the hex values. The next line increments the address by 8 and so on.

The hex dump is interesting, as it displays text embedded in the operating system. In Low Rom you will discover after the titles some strange names — Schneider for example. Even Arnold, the pet name for the machine, is mentioned. High Rom lists all the error codes. Well, have a look and see!

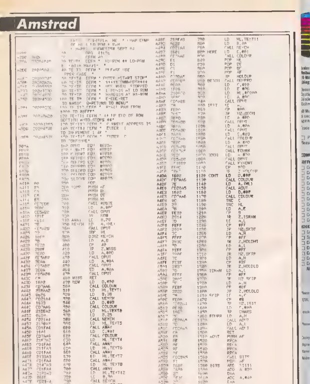
Potentially the Hex-dump can be very useful. Look for C9 (this is a return instruction) — the codes following this may well be the start of a useful sub-routine.

Within the bounds of a small article and one simple program, many points will go unmentioned — much will be oversimplified.

I hope to have given you a new slant to your machine without incurring too many 'tuts tuts' from those that know more, and those that know better!

```
[illegible]
```

Amstrad

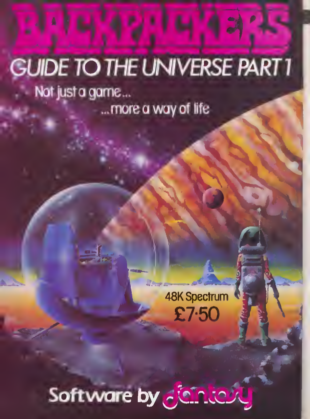


```
                   ; DISPLAY HEX / CHAR DUMP
                   OF HI & LO ROM & RAM
                   ; ANDREW ADEMESTIS SEPT 84
A3E6               10         ORG  #A3E6
A3E6  2020         20         DEFM "  "
A3EA  20204F4F     30 TEXT1   DEFM " HI-ROM ** LO-ROM
                   & Colin Harris "
A20E  2020504C     40 TEXT3   DEFM " PLEASE USE
                   UPPER CASE "
A2F7  20202020     50 TEXT4   DEFM " ENTER =START STOP"
A300  2A2A2A2A     60 TEXT5   DEFM " ***** COMMANDS****
A31F  20205550     70 TEXT6   DEFM " USE WHEN  STOPPED
A333  2020202D     80 TEXT7   DEFM " L BEGIN AT LO ROM
A347  20204820     90 TEXT8   DEFM " H=BEGIN AT HI-ROM
A35B  2020453D     100 TEXT9  DEFM " E-EXC-RET
                   TO BASIC  Q=RETURN TO MENU"
A384  20205220     110 TEXT10 DEFM " R=ALL RAM FROM
                   #000 TO #BFFF"
A39F  20202A20     120 TEXT11 DEFM " ** AT END OF ROM
                   SECTION AUTO STOPS **"
A3CE  20201255     130 TEXT12 DEFM " C URRENT ADDRESS IS
A3DB  20204E0E     140 TEXT13 DEFM " ENTER  I
                   TO INCREMENT 1 4K "
A3F8  2020451F     150 TEXT15 DEFM " ENTER  C
                   TO CONTINUE"
BB5A               160 OPUT    EQU  #BB5A
BB18               170 KWAIT   EQU  #BB18
BB1B               180 KYNOWT  EQU  #BB1B
BB0A               190 SETPEN  EQU  #BB0A
B900               200 DILORO  EQU  #B900
B906               210 DEHIRO  EQU  #B906
B906               220 DILORO  EQU  #B906
B90B               230 DELORO  EQU  #B90B
BB75               240 SETCUR  EQU  #BB75
A410  00           250         NOP
A411  F5           260 TOPP    PUSH AF
A412  C5           270         PUSH BC
A413  D5           280         PUSH DE
A414  E5           290         PUSH HL
A415  CD7EBB       300         CALL #BB7E
A418  3E0C         310         LD   A,#0C
A41A  CD5ABB       320         CALL OPUT
A41D  181E         330         JR   NOW
A41F  0614         340 AWAY    LD   B,20
A421  7E           350 NEXCH   LD   A,(HL)
A422  CD5ABB       360         CALL OPUT
A425  23           370         INC  HL
A426  10F9         380         DJNZ NEXCH
A428  78           390         LD   A,B
A429  FE28         400         CP   40
A42B  280F         410         JR   Z,MISS
A42D  3E0D         420         LD   A,#0D
A42F  CD5ABB       430         CALL OPUT
A432  3E0A         440         LD   A,#0A
A434  CD5ABB       450         CALL OPUT
A437  3E0A         460         LD   A,#0A
A439  CD5ABB       470         CALL OPUT
A43C  C9           480 MISS    RET
A43D  1602         490 NOW     LD   D,#02
A43F  CD7AA6       500         CALL COLOUR
A442  21EAA2       510         LD   HL,TEXT1
A445  0626         520         LD   B,38
A447  CD21A4       530         CALL NEXCH
A44A  1603         540         LD   D,#03
A44C  CD7AA6       550         CALL COLOUR
A44F  21DEA2       560         LD   HL,TEXT3
A452  0619         570         LD   B,25
A454  CD21A4       580         CALL NEXCH
A457  2100A3       590         LD   HL,TEXT5
A45A  CD1FA4       600         CALL AWAY
A45D  1601         610         LD   D,#01
A45F  CD7AA6       620         CALL COLOUR
A462  21F7A2       630         LD   HL,TEXT4
A465  CD1FA4       640         CALL AWAY
A468  211FA3       650         LD   HL,TEXT6
A46B  CD1FA4       660         CALL AWAY
A46E  2133A3       670         LD   HL,TEXT7
A471  CD1FA4       680         CALL AWAY
A474  2147A3       690         LD   HL,TEXT8
A477  CD1FA4       700         CALL AWAY
A47A  21B1A3       710         LD   HL,TEXT12
A47D  061E         720         LD   B,30
A47F  CD21A4       730         CALL NEXCH
A482  21FBA3       740         LD   HL,TEXT9
A485  0620         750         LD   B,32
A487  CD21A4       760         CALL NEXCH
A48A  1E00         770         LD   E,#0C
A48C  CD7AA6       780         CALL COLOUR
A48F  219FA3       790         LD   HL,TEXT11
A492  0628         800         LD   B,40
A494  CD21A4       810         CALL NEXCH
A497  1601         820 HERE    LD   D,#01
A499  CD7AA6       830         CALL COLOUR
A49C  E1           840         POP  HL
A49D  D1           850         POP  DE
A49E  C1           860         POP  BC
A49F  F1           870         POP  AF
A4A0  C30DA5       880         JP   HOLDUP
A4A3  CD00B9       890 BEGIN   CALL DIHIRO
A4A6  0E00         900         LD   C,#00
A4A8  1E06         910         LD   E,#06
A4AA  2100C0       920         LD   HL,#C000
A4AD  3E0C         930         LD   A,#0C
A4AF  CD5ABB       940         CALL OPUT
A4B2  78           950 ISIT    LD   A,B
A4B3  FE00         960         CP   #00
A4B5  2017         970         JR   NZ,DOON
A4B7  3E0D         980         LD   A,#0D
A4B9  CD5ABB       990         CALL OPUT
A4BC  3E0A         1000        LD   A,#0A
A4BE  CD5ABB       1010        CALL OPUT
A4C1  1603         1020        LD   D,#03
A4C3  CD7AA6       1030        CALL COLOUR
A4C6  3E0D         1040        LD   A,#0D
A4C8  CD5ABB       1050        CALL OPUT
A4CB  CD176A       1060        CALL FOURB
A4CE  3E20         1070 DOON   LD   A,#20
A4D0  CD5ABB       1080        CALL OPUT
A4D3  CD1BBB       1090        CALL KYNOWT
A4D6  FE0D         1100        CP   #0D
A4D8  CA0DA5       1110        JP   Z,HOLDUP
A4DA  1602         1120 CONT   LD   D,#02
A4DC  CD7AA6       1130        CALL COLOUR
A4DF  7E           1140        LD   A,(HL)
A4E0  CD20A5       1150        CALL AOUT
A4E3  1602         1160        LD   D,#02
A4E5  CD7AA6       1170        CALL COLOUR
A4E8  0C           1180        INC  C
A4E9  23           1190        INC  HL
A4EA  7B           1200        LD   A,E
A4EB  FE09         1210        CP   9
A4ED  2814         1220        JR   Z,ISRAM
A4EF  7D           1230        LD   A,L
A4F0  FEFF         1240        CP   #FF
A4F2  2019         1250        JR   NZ,SKIP
A4F4  7C           1260        LD   A,H
A4F5  FEFF         1270        CP   #FF
A4F7  283C         1280        JR   Z,HOLDHI
A4F9  7D           1290        LD   A,L
A4FA  FEFF         1300        CP   #FF
A4FC  200F         1310        JR   NZ,SKIP
A4FE  7C           1320        LD   A,H
A4FF  FE3F         1330        CP   #3F
A501  2837         1340        JR   Z,HOLDLO
A503  7D           1350 ISRAM  LD   A,L
A504  FEFF         1360        CP   #FF
A506  2005         1370        JR   NZ,SKIP
A508  7C           1380        LD   A,H
A509  FEBF         1390        CP   #BF
A50B  2820         1400        JR   Z,HOLDLO
A50D  79           1410 SKIP   LD   A,C
A50E  FE08         1420        CP   #8
A510  C2B2A4       1430        JP   NZ,ISIT
A513  0E00         1440        LD   C,#00
A515  1807         1450        JR   CHARS
A517  7C           1460 FOURB  LD   A,H
A518  CD20A5       1470        CALL AOUT
A51B  7D           1480        LD   A,L
A51C  CD20A5       1490        CALL AOUT
A51F  C9           1500        RET
A520  F5           1510 AOUT   PUSH AF
A521  0F           1520        RRCA
A522  0F           1530        RRCA
A523  0F           1540        RRCA
A524  0F           1550        RRCA
A525  CD29A5       1560        CALL BITS
A528  F1           1570        POP  AF
A529  E60F         1580 BITS   AND  %1111
A52B  C690         1590        ADD  A,#90
A52D  27           1600        DAA
A52E  CE40         1610        ADC  A,#40
A530  27           1620        DAA
A531  CD5ABB       1630        CALL OPUT
A534  C9           1640        RET
A535  2100C0       1650 HOLDHI LD   HL,#C000
A538  1833         1660        JR   HOLDUP
A53A  2100         1670 HOLDLO LD   HL,#000
```

continued on page 71


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```
A5?? ???        1??? ?????? LD   A,#07
A5?? CD5AB8     1???        CALL OPUT
A51? CD1BB8     17??        CALL K WAIT
A51? FE1B       1710        CP   #1B
A51? CAABA4     1720        JP   Z,BEGIN
A51A FE48       1730        CP   #48
A51C 2817       1740        JR   Z,HOMORE
A51E FE0D       1750        CP   #0D
A550 2808       1760        JR   Z,CONT
A552 FE4C       1770        CP   #4C
A554 2815       1780        JR   Z,LOROM
A556 FE51       1790        CP   #51
A558 CA11A4     1800        JP   Z,TOPS
A55B FE52       1810        CP   #52
A55D 2864       1820        JR   Z,ALLRAM
A55F FE1D       1830        CP   "1"
A561 2875       1840        JR   Z,UPABIT
A563 18D?       1850        JR   HOLDUP
A565 1601       1860 HOMORE LD   D,#01
A567 CD7AA6     1870        CALL COLOUR
A56A C9         1880        RET
A56B 0E08       1890 LOROM  LD   C,#08
A56D 1E03       1900        LD   E,#03
A56F 210000     1910        LD   HL,#0000
A572 CD06B9     1920        CALL OHLDRD
A575 3E0C       1930        LD   A,#0C
A577 CD5AB8     1940        CALL OPUT
A57A C382A4     1950        JP   1SIT
A57D C9         1960        RET
A57E 3E20       1970 CHARS  LD   A,#20
A580 CD5AB8     1980        CALL OPUT
A583 3E0?       1990        LD   A,#0?
A585 CD5AB8     2000        CALL OPUT
A588 1601       2010        LD   D,#01
A58A CD7AA6     2020        CALL COLOUR
A58D D5         2030        PUSH DE
A58E 110000     2040        LD   DE,#000B
A591 ED52       2050        SBC  HL,DE
A593 D1         2060        POP  DE
A594 E5         2070 INCH   PUSH HL
A595 D5         2080        PUSH DE
A596 C5         2090        PUSH BC
A597 F5         2100        PUSH AF
A598 7E         2110        LD   A,(HL)
A599 FE20       2120        CP   #20
A59B FAABA5     2130        JP   M,COLCH
A59E FE7E       2140        CP   #7E
A5A0 FAABA5     2150        JP   M,TEXCH
A5A3 1603       2160 COLCH  LD   D,#03
A5A5 CD7AA6     2170        CALL COLOUR
A5A8 CD5DB9     2180 TEXCH  CALL #BB5D
A5AB 1601       2190        LD   D,#01
A5AD CD7AA6     2200        CALL COLOUR
A5B0 F1         2210        POP  AF
A5B1 C1         2220        POP  BC
A5B2 D1         2230        POP  DE
A5B3 E1         2240        POP  HL
A5B4 23         2250        INC  HL
A5B5 0C         2260        INC  C
A5B6 79         2270        LD   A,C
A5B7 FE0?       2280        CP   #0?
A5B9 20D9       2290        JR   NZ,INCH
A5BB 0E00       2300        LD   C,#00
A5BD C382A4     2310        JP   1SIT
A5C0 C311A4     2320 FINIT  JP   TOPS
A5C3 CD00B9     2330 ALLRAM CALL OFLORD
A5C6 CD06B9     2340        CALL ONUPRD
A5C9 3E0C       2350        LD   A,#0C
A5CB CD5AB8     2360        CALL OPUT
A5CE 210000     2370        LD   HL,#0000
A5D1 0E00       2380        LD   C,#00
A5D3 1E0?       2390        LD   E,?
A5D5 C382A4     2400        JP   1SIT
A5D8 3E0C       2410 UPABIT LD   A,#0C
A5DA CD5AB8     2420        CALL OPUT
A5DD D5         2430        PUSH DE
A5DE C5         2440        PUSH BC
A5DF F5         2450        PUSH AF
A5E0 E5         2460        PUSH HL
A5E1 3E0?       2470        LD   A,#0?
A5E3 CD??B9     2480        CALL SETPEN
A5E6 21CBA?     2490        LD   HL,TEXT1?
A5E9 0616       2500        LD   B,22
A5EB CD?1A1     2510        CALL HEXCH
A5EE 3E0C       2520        LD   A,#0D
A5F0 CD5AB8     2530        CALL OPUT
A5F3 3E0A       2540        LD   A,#0A
A5F5 CD5AB8     2550        CALL OPUT
A5F8 21C?A?     2560        LD   HL,TEXT14
A5FB 061?       2570        LD   B,22
A5FD CD?1A?     2580        CALL HEXCH
A600 3E0D       2590        LD   A,#0D
A602 CD5AB8     2600        CALL OPUT
A605 3E0A       2610        LD   A,#0A
A607 CD5AB8     2620        CALL OPUT
A60A 21F?A?     2630        LD   HL,TEXT1?
A60D 061?       2640        LD   B,22
A60F CD?1A?     2650        CALL HEXCH
A612 E1         2660        POP  HL
A613 F1         2670        POP  AF
A614 C1         2680        POP  BC
A615 D1         2690        POP  DE
A616 2E00       2700        LD   L,0
A618 24         2710 WAIT   INC  H
A619 CD62A6     2720        CALL ENSTOP
A61C 7C         2730        LD   A,H
A61D BA         2740        CP   D
A61E 20F3       2750        JR   NZ,OK
A620 61         2760        LD   H,C
A621 0E00       2770        LD   C,#00
A623 F5         2780 OKAY   PUSH AF
A624 E5         2790        PUSH HL
A625 21011F     2800        LD   HL,#1F01
A628 CD75BB     2810        CALL SETCUR
A62B 3E01       2820        LD   A,#01
A62D CD90BB     2830        CALL SETPEN
A630 3E2A       2840        LD   A,"*"
A632 CD5AB8     2850        CALL OPUT
A635 210117     2860        LD   HL,#1701
A638 CD75BB     2870        CALL SETCUR
A63B E1         2880        POP  HL
A63C F1         2890        POP  AF
A63D CD17A5     2900        CALL CONPB
A640 CD1BB8     2910 TESTIT CALL K WAIT
A643 FE43       2920        CP   "C"
A645 28??       2930        JR   Z,CONT
A647 FE49       2940        CP   "1"
A649 28?D       2950        JR   Z,WAIT
A64B 18F3       2960        JR   TESTIT
A64D 0E00       2970 SOFT   LD   C,#00
A64F F5         2980 START  PUSH AF
A650 E5         2990        PUSH HL
A651 D5         3000        PUSH DE
A652 C5         3010        PUSH BC
A653 CD??B9     3020        CALL #BB03
A656 C1         3030        POP  BC
A657 D1         3040        POP  DE
A658 E1         3050        POP  HL
A659 F1         3060        POP  AF
A65A 3E0C       3070        LD   A,#0C
A65C CD5AB8     3080        CALL OPUT
A65F C382A4     3090        JP   1SIT
A662 7B         3100 ENSTOP LD   A,E
A663 FE0?       3110        CP   #0?
A665 200?       3120        JR   NZ,ENSE
A667 1E2F       3130        LD   D,#2F
A669 0E00       3140        LD   C,#00
A66B C9         3150        RET
A66C FE06       3160 ENSE   CP   #06
A66E 2005       3170        JR   NZ,ENSD
A670 16FF       3180        LD   D,#FF
A672 0EC0       3190        LD   C,#C0
A674 C9         3200        RET
A675 16BF       3210 ENSD   LD   D,#BF
A677 0E00       3220        LD   C,#00
A679 C9         3230        RET
A67A F5         3240 COLOUR PUSH AF
A67B E5         3250        PUSH HL
A67C 7A         3260        LD   A,D
A67D CD90BB     3270        CALL SETPEN
A680 E1         3280        POP  HL
A681 F1         3290        POP  AF
A682 C9         3300        RET

ALLRAM A5C3  AUDT    A618  AONT    A528  AWAI    A41F
BEGIN  A1?? BITE     A5?8  CHARS   A57E  COLCH   A5A3
COLOUR A67A  CONT    A4FA  ENSE    A66C  ENSD    A675
ENSTOP A662  FINIT   A5C0  FONPB   A51?  CONPB   A?CE
HERE   A1??  HOLDH1  A395  HOLDLO  A?BA  HOLDUP  A?BD
INCH   A594  1SIT    A482  1SEAM   A50?  K HOWI  BB1?
K WAIT BB18  LOROM   A56B  MISS    A3?? HEXCH    A471
HOMORE A565  HOW     A?9D  OFLORD  B900  OFUPRD  B903
OKAY   A623  OHLDRD  B906  ONUPRD  B90? OPUT     BB5A
SETCUR BB75  SETPEN  BB90  SKIP    A50C  SOFT    A64D
START  A64F  TESTIT  A640  TE CH   A5A8  TEXT1   A2BA
TEXT11 A2?F  TEXT12  A2?1  TEXT13  A2C6  TEXT14  A2DC
TEXT15 A2E?  TEXT2   A20E  TEXT4   A2F?  TEXT5   A2?B
TEXT6  A21F  TEXT7   A2?3  TEXT8   A2?7  TEXT9   A2?8
TOPS   A411  UPABIT  A5D8
```

Open Forum

We are always actively seeking programs for publication — either for Open Forum, the machine pages or Star Game. When sending in a program for consideration, a clear program listing should be sent, together with, wherever possible, a saved copy on cassette. Documentation — usually not more than 1000 words — should start with a general description of the program, what it does, and then some detail of how the program itself is constructed. We pay very competitive rates, according to the length and nature of the program and the quality of the accompanying documentation.

Screen Fill

on Vic 20

This short machine code routine will work on the unexpanded Vic 20. It allows the user to fill in any window on the screen in any character and in any colour.

The locations which hold the values of the window, character and colour are shown in the listing which, at present, is set up to fill the whole screen with character ϕ in black. The routine can also be used as a partial screen clear by using Character 32. The routine is called by *Sys 7168*.

```
1 REM **SCREEN FILL**
5 POKE56,28:CLR
20 FORS=7168TO7241:READN:POKES,N:NEXT S
100 DATA169,0,133,87,169,30,133,88,165,87,133,89,165,88,105,120,133,90,
169,0,133
110 DATA91,169,0,133,92,162,23,160,22,136,165,91,145,87,165,92,145,
89,136
120 DATA208,245,145,89,165,91,145,87,24,165,87,105,22,133,87,144,2,
230,88
130 DATA24,165,89,105,22,133,89,144,2,230,90,202,208,211,96
1000 REM 7169&7173 - TWO BYTE LOCATION OF TOP LEFT CORNER OF SCREEN
 TO FILL
1010 REM 7187 - CHARACTER  7191 - COLOUR  7195 - NO.ROWS  7197 -
NO.COLUMNS
```

Screen Fill
by M Poole

Arcade Avenue

Pyjamagames

Congratulations go out this week to a couple of 'firsts'. From S Ryatt of Hayes comes the claim to be the first to finish *Zombie Zombie*, Quicksilva's follow-up to *Ant Attack*. "I finished at 1.45 pm on Saturday 6th October after killing 14 zombies. The message appears 'You've beaten us this time human. But we'll get you next time' accompanied by a burst of *March of the Toreadors* in what sounds like two channel sound."

It's difficult to say who was actually the first because in the same postbag arrived a letter from W E Cowling of Redruth who has also finished, with 1233 points, but does not give a date. He/she also sends these tips. "In order to kill the zombies you must first use your helicopter to build up one of the walls. Make the wall 3 blocks high and as long as you possibly can as this gives you more points. Don't forget to put steps at one end to climb up. Then find the zombies and pick one out that is not too close to the others. Then if you are in the copter you can land directly behind him and touch him on the back so he turns magenta and you can control him. You then lead the zombie on foot to your wall and he will follow you along to the musical accompaniment of *Ten Green Bottles*. You can then walk off the end and the zombie will fall to its death."

Andrew Dudinex of Glossop writes "I have finished Mikrogen's fantastic game *Pyjamarama*. When you insert the alarm key the clock rings for a while, there is a short firework display and then the message Congratulations Wally's woken up. For the first time in his life Wally will be early for work. Now look out for *Life of Wally*. I think this must be my favourite Spectrum game of all time. Games to keep away from are Quicksilva's *Timegate*, *Centipede* by C-Tech and *Terror Daktil 4D* from Melbourne House."

Andrew then goes on to give some tips for *Pyjamarama* — so those of you who don't want to know how to do it go to the next paragraph NOW! "Get the driving licence to get the ignition keys to slide down the bannister to get the helmet. Then get the library ticket to get the book. With the ticket and the book you can get the scissors to cut the balloon and get the key (the HELP feature must be on). Then get the magnet to get the alarm key on the moon and bring it back.." Many, many thanks for that Andrew, but something tells me it will won't be easy.

Now then, here's a letter about a game that I am completely unfamiliar with from Guy Hedley of Chandlers Ford. "At 3am on Thursday 25th October I successfully completed test 5 of Incentive Software's new program *Back Track*. Am I the first?" Well, is he?

Paul Rhodes of Luton has written to tell me that the price of his *Jet-Set Editor* I mentioned some weeks ago is in fact £4 (see PCW 27th Sept for the address).

Paul also wants to put in a plug for *Dark Star* from Design-Design. "It is surely the best of its kind for the Spectrum. After weeks of play I am still astounded at the speed of movement and have yet to finish it even at the very easiest level." I'm sure that it is a game we will be hearing a lot more of in future Avenues, Paul.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to Tony Kendle, Arcade Avenue, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Open Forum

Row of Four

on Commodore 64

This is a two-player game for the CBM 64, which is quite good fun to play The listing was done on a Commodore 1520 Printer-Plotter which does not print Graphics characters, so when typing in, you should pay attention to the Rem statements

Program notes

14-80	Random Display
100 860	Title page
800-1130	Input names of players
1200-1340	Game Screen
1380 2000	Checks key pressed
2100 2840	Prints a score table
2800 2840	Another game
2900-3000	routine

```
5 REM ****************
6 REM * FOUR-IN A ROW *
7 REM *              *
8 REM *      BY      *
9 REM *              *
10 REM* NEIL GREENWOOD*
11 REM****************
12 REM*         1984 *
13 REM****************
14 PRINT "" REM CLR
15 FORI=1 TO 15
20 =INT(RND(1)*15)+1
22 FORA 1 TO10
25 POKE53280 , POKE53281 I
30 NEXT A I
35 POKE53281,4 POKE53280,3
40 FORQ=1024TO2023:T=INT(RND(1)*20)+1 P
OKEQ T NEXT
45 FORY=55296TO56295 O INT(RND(1)*14)+1
POKEY O NEXT
40 PRINT QQQQQQQQQQ1111111111111FOUR IN
 A ROW  REM BLACK
42 PRINT 1111111111QQBY NEIL L GREENWOOD

50 PRINT Q1111111111111111HIT A KEY1  RE
M BLACK
60 GET A$:IFA$   THEN60
90 LET S=0
95 LET C=0
100 PRINT   POKE53281,5 POKE53280 14
150 PRINT S11111111111111FOUR IN A ROW  R
EM GREEN & HOME
200 PRINT 11111111111111***************  RE
M ORANGE
250 PRINT QQ1THE OBJECT OF THIS GAME IS
 TO GET FOUR   REM WHITE
300 PRINT"OF YOUR COUNTERS IN A ROW
310 PRINT TYPE IN YOUR NAME(NO LONGER IH
AN 15   LETTERS)
350 PRINT 11FIRSTLY YOU TYPE IN YOUR PLA
YER NUMBER )
400 PRINT AND THEN THE POSITION YOU WANT
 YOUR
450 PRINT COUNTER
455 PRINT  PRESS SPACE WHEN THE GAME IS
OVER
460 PRINT YOU WILL THEN BE ASKED WHO WON
 TYPE
465 PRINT IN THE WINNERS NAME,IF THE GAM
E WAS
470 PRINT"DRAWN TYPE IN DRAWN  REM WH
ITE RVS ON & OFF
475 PRINT"Q  10 POINT S FOR A WIN "
480 PRINT Q   5 POINT S FOR A DRAWN GAME

485 FORI=1065TO1982 POKEI,80 FOR2 1TO10:
NEXTZ I
490 FORP=56137TO56175 X=INT(RND(1)*14)+1
 POKEP,X NEXT
500 PRINT Q11111111111111RHIT A KEY "R
EM YELLOW
550 GETB$ IFB$="" THEN550
600 PRINT " POKE53281,7 POKE53280,0 PRI
NT"2"
650 PRINT S1111111111111FOUR-IN-A-ROW
660 PRINT 111111111111***************
670 PRINT QQRINPUT PLAYER ONE S NAME
REM ORANGE
680 INPUT Q PO$
685 IFLEN(PO$)>15THEN650
690 PRINT"QQRINPUT PLAYER TWO S NAME
REM BROWN
700 INPUT Q PT$
710 IFLEN(PT$)>15THEN650
750 FORI 1TO1000 NEXTI
800 PRINT   POKE53281 0 POKE53280 5:PRI
NT "
850 PRINT S111111111111FOUR IN-A ROW
900 PRINT C11111111111***************
950 PRINT QQ11111111111111  PO$
1000 PRINT"QQ11111111111111R L
R L
1010 PRINT 111111111111R L           R
1020 PRINT 111111111111R L           R
1030 PRINT 111111111111R L           R
1040 PRINT 111111111111R L           P
1050 PRINT 111111111111R L           R
1VERSUS1
1060 PRINT 11111111111111R L       R L
1070 PRINT 111111111111111R L     R
1080 PRINT 1111111111111111R L    R L
1090 PRINT 11111111111111111R L  R L
1100 PRINT 111111111111111111R R L
1110 PRINT 1111111111111111111R
1120 PRINT QQ111111111 1111  PT$ REM MED
GREY
1130 FOR  1TO2000:NEXTI
1200 PRINT   POKE53280,5 POKE53281   PR
INT "
1220 PRINT S11111111111111FOUR-IN A ROW
1230 PRINT  1 1111 111 ***************
1233 PRINT QQ
1235 FORI=1 05
1237 REM (SHIFT+Q,CBM +EY+T,SHIFT+P ) N N
```

Microradio

GW6JJN

Autostart

This weeks mailbag includes a bumper bundle from Michael Farrington of 3 Julia Crescent, Stonebroom, Derbyshire bringing very good news indeed for readers with the Sharp MZ700 micro I am often asked about radio software for this machine and so far there has been very little Now that situation has changed. Mr Farrington has put together a suite of programs including an interface for radio comms on the Sharp MZ700 It includes RTTY and the driving software for a 300 baud modem.

Firstly, the RTTY program. It is written entirely in machine code and offers the following features It can operate at 45.5, 50, 75 and 110 baud which covers most amateur and commercial applications Split screen mode operates with seven memories, each with one thousand characters making it simple to prepare messages saving air time for slower typists

As is the norm nowadays with such software, a real time clock is available on screen and for transmission of the time of message The author points out that only a fairly simple terminal unit is required on the Sharp and this can be home-made or provided with the program The tone frequencies are extremely accurate and the facility to store call signs, etc to be sent automatically is present within the software

Any page that appears on screen, messages, the instructions, menus, memories etc can be dumped to the printer for a permanent record. One aspect of this program that appealed to me was the Clock function which can be called, when the micro is not actually being used as a terminal to send or receive RTTY, in order to use the screen to display the time as a general purpose digital clock. This function will display the time in 24 hour format in two inch high, seven segment figures

The nicest touch of all, in my opinion, and something that I've not seen before in such a program is the autostart feature This is just what is needed for the amateur and it works like this Once shift/A is pressed, the micro can be left to listen or monitor a particular frequency On the Amateur bands as well as others, there may be noise, speech or whatever between messages Most programs interpret this as jumbled characters on the screen. Not so this program On Autostart the software listens and can detect only valid RTTY signals and will decode them. All note, speech, etc is ignored.

Also from Mr Farrington is a terminal emulation program for the Sharp MZ700 The same terminal interface is used as for the RTTY The terminal program allows for 300 baud semi-duplex and can call, answer or self test the terminal unit Details of a home constructed acoustic coupler can be had along with the unit.

Michael Farringtons programs at £10 for the RTTY and £8 for the terminal emulation will provide a splendid opportunity for Sharp owners to get on the air As it is among the best software of its kind that I have seen, all credit must go Michael and we look forward to the AMTOR programs he promises for the future

Ray Berry

This series of articles is designed for radio and microcomputer enthusiasts alike If you have any queries that you want answered, hints and tips to share or topics that you would like to see covered write to Ray Berry, Microradio *Popular Computing Weekly* 12-13 Little Newport Street, London WC2R 3LD

Open Forum

```
1210 PRINT ...
1240 REM (CBM KEY+G CBM KEY+M) NINE TIME
S
1250 PRINT ...
1255 REM (SHIFT+L,CBM KEY+@,SHIFT+B)NINE
 TIMES
1260 PRINT ...
1270 NEXT I
1280 PRINT ... REM BLUE/CRSR UP
1285 REM CRSR LEFT
1290 PRINT ...
1300 PRINT ...
1310 PRINT ...
1320 PRINT ...
[illegible]
1540 IFA$="0"THENPOKE1384+19,X:POKE55656
1550 IFA$="E"THENPOKE1384+22,X:POKE55...
1560 IFA$="..."THENPOKE1384+25,X:POKE556...
1570 IFA$="..."THENPOKE1384+28,X:POKE55656
1580 IFA$="..."THENPOKE1384+31,X:POKE55656
1590 IFA$="..."THENPOKE1504+7,X:POKE55776
1600 IFA$="..."THENPOKE1504+10,X:POKE55776
1610 ...THENPOKE1504+13,X:POKE55776
[illegible]
1820 IFA$="..."THENPOKE1744+22,X:POKE56016
1830 IFA$="..."THENPOKE1744+25,X:POKE56016
1840 IFA$="?"THENPOKE1744+28,X:POKE56016
1850 IFA$="..."THENPOKE1744+31,X:POKE56016
[illegible]
3040 END
```

Row of Four
by N Greenwood

Baud Walk

Breaking in

Hacking has hit the headlines once again and crys of outrage ring out along the corridors of BT and various database operators.

It's probably also seen as bad news by most 'traditional hackers' — the people who enjoy breaking into a system not for the information they can get but for the challenge of doing it.

I don't wish to condone hacking but there is a difference between the new teeny-hackers who got into Prestel and the old style traditionalists. The former are likely to substantially reduce the facilities available on databases as operators shocked by the damage done, tighten up.

There was nothing particularly clever about this latest hacking of Prestel. As I understand it, it was more to do with the system management than some clever microfreak cracking a mysterious code.

Similarly the episode when Telecom Gold was hacked on a live TV show probably had more to do with users not guarding their account numbers (the equivalent of your cheque card signature) sufficiently.

As long as good database housekeeping is maintained systems like these are fairly secure. What the hackers do is attempt to log-on using sequential numbering and alphabet patterns until they strike lucky. Some also try sequential telephone dialing in particular patterns until they hit an 'ex-directory' number.

It's not really this type of hacking that concerns most people on a serious level — wire tapping of data lines has more far-reaching implications. My message to hackers is if you must try to break in and prove yourself against the security, leave it at that: inform the organisation of the security gap and don't mess about with the system to cause embarrassment otherwise the consequences will be much less flexible databases.

N.B. If you are using a database with account numbers and log-on passwords change them every week. And select odd combinations of letters and numbers.

Robin Wilkinson

Baud Walk is a new weekly column with news on networking, databases, reviews of modems and software and points of contact for information.

Any readers with experience of networking are asked to send their experiences or news of services to Robin Wilkinson, Baud Walk, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

He can also be contacted on Prestel mailbox 019993727

Open Forum

Line Feed

on Amstrad

As the User Manual informs you, the Amstrad Basic issues a line feed *Chr$(10)* and a carriage return *Chr$(13)* to a printer. If your printer, as mine does, also line feeds then *List* produces a double spacing. My solution is to use a short sub-routine to detect *Chr$(10)* and to change it.

The *Jumpblock* for printing a character is *$BD2B* which is in Ram and so can be amended. My program *Pokes* a jump to 43000 and *Pokes* into 43000-43008 the following:

CP 10 — Compare A with 10
JRNZ 1 — Jump if not 10
ADD A,A — Doubles A to 20
RST 08 — Default codes at $BD2D = CFF28C

To test, enter the listing then run it. *Set Width* 255 then List, #8. You should get a normal listing.

For future use Save this program, then *Load* the program you wish to list. *Width 255* then *List, #8*

```
10 CLS:MEMORY 42999
20 FOR a=48427 TO 48429
30 READ b:POKE a,b
40 NEXT a
50 FOR a=43000 TO 43008
60 READ b:POKE a,b
70 NEXT a
80 DATA 195,248,167,254,10,32,1,135,207,242,135,201
```

Line Feed
by J Povey

The Music Box



Half-way good

I've just spent a couple of hours playing with Supersoft's *Music Master* program, written for the Commodore 64 by Nick Higham.

Like all the music programs around at the moment, *Music Master* is a half-way good program — which is only to say that it has weaknesses and strengths. Despite the program's regrettable name, its strengths make *Music Master* the equal — if not the superior — of any program designed to turn the 64 into a real-time keyboard. In particular the pre-set backing-track facility is versatile and sounds good (even through an unmodified TV set). Where *Music Master* falls down is on its sequencing — the ability to digitally 're-cord' tracks.

When will somebody produce an adequate self-contained sequencer allowing over-dubbing and mixing of the 64's three sound channels from the computer keyboard in real-time? Even the much-vaunted *MusiCalc* from the American company Waveform is lacking in this respect.

The important thing, as far as sequencing is concerned, is to be able to hear one track while you are recording another — in other words, to be able to accompany yourself. While *MusiCalc* allows you to alter and edit tracks at will it only allows you to do this with great difficulty, and the ability to accompany yourself in a simple and obvious way seems to be entirely absent.

If I've missed something in either of these programs (which, incidentally, share this lack with Quicksilva's *Ultisynth* and Commodore's own *Music Maker*) please let me know. I suspect I haven't, partly because my own experience suggests that the timing of a three-channel sequencer is quite tricky, since you have to read and write to the computer's sound chip at more or less the same moment.

Step-time sequencing is another matter. This involves writing notes in one form or another and using the screen as a sort of score. Notes are entered in sequence but one step at a time, often by typing in their name (C major, for example). Here *Music Master* has the edge on *MusiCalc*, even though it is still not perfect by any means. The problem is with notation — *Music Master* uses parallel lines on which note names appear as you play them while *MusiCalc* uses grids and funny bar-graphs which look nice but are distinctly unwelcoming and not really helpful to the composer.

The model of step-time sequencing has to be Island Logic's *The Music System* for the BBC Model B (a Commodore version is expected in Spring next year).

This is the nearest thing to a real composing program, allowing you to write music to actual staves in authentic composing fashion. What's more, the staves can then be dumped to any Centronics dot-matrix printer. I hope somebody comes up with a form of notation superior to the traditional variety but they haven't yet.

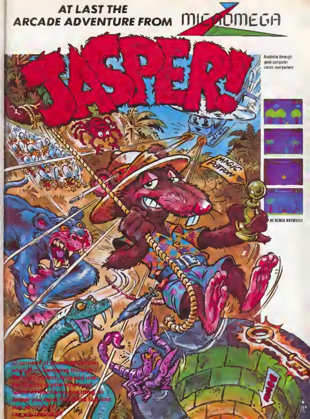
Maybe owning a program like *The Music System* will persuade and help the faint-hearted to learn the traditional techniques of reading and writing music. *The Music System* is excellent. I have only three reservations: the BBC sound chip is one, the lack of a polyphonic synthesiser feature is another, and the manual, which seems to have been designed for good looks rather than clarity, is the third.

Nevertheless, a composing tool to be reckoned with — I can hardly wait for the 64 version.

Gary Herman

The Music Box is a new weekly column with news, reviews and readers comments on all aspects of micros and music.

Any readers with experience of computer music making or companies with new product news are invited to write to drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 3LD



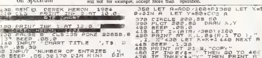
AT LAST THE
ARCADE ADVENTURE FROM MICROMEGA
JASPER!
Available through
good computer
stores everywhere
MAGIC Potion
BY DEREK BREWSTER
DOWN

Open Forum

Pie charts

on Spectrum

This will convert percentage inputs into degrees. It is reasonably user friendly and will not for example, accept more than 100% as an input. Your various entries are labelled and displayed at the end of the operation.



```
 130 REM © DEREK HERON 1984
 110 CLS : PRINT INK 2;AT 10,0;"     PIE CHART     "
 120 PRINT INK 1;AT 12,0;"
     DEREK HERON 1984"
 130 PAUSE 0: CLS 135 POKE 23658,0
 137 BEEP .05,0
 140 INPUT "CHART TITLE  ";T$: BEEP .05,30
 150 INPUT "NUMBER OF ENTRIES ";N
 160 BEEP .05,30 170 DIM A(N): DIM B$(N,10): LET SUM=0 180 FOR T=1 TO N
 185 BEEP .05,10 190 PRINT AT 2,2;"NUMBER OF ENTRIES ";N
 200 PRINT AT 4,2;"ENTRY NUMBER ";T
 205 BEEP .05,40
 210 INPUT "PERCENTAGE TITLE";B$(T)
 215 BEEP .05,40 220 INPUT "PERCENTAGE  ";P 230 LET SUM=SUM+P 240 IF SUM>100 THEN LET SUM=SUM-P: GO TO 220 250 PRINT AT 6,2;"TOTALPERCENTAGE  ";SUM 260 LET P=(P/100)*360
 270 LET A(T)=P 280 IF SUM=100 THEN PRINT AT 6,2;"TOTAL PERCENTAGE  ";SUM: BEEP .1,30: GO TO 300 290 NEXT T 300 CLS 305 PRINT INK 2;AT 1,(32-LEN T$)/2; INVERSE 1;T$ 310 LET ADD=0: LET K=4: LET L=2 320 FOR R=1 TO N
 330 LET T=A(R) 340 LET ADD=ADD+T
 350 LET A=ADD/180*PI 360 LET X=50*SIN A: LET Y=50*COS A
 370 CIRCLE 200,88,50
 390 PLOT 200,88: DRAW X,Y
 400 BEEP .05,0
 410 LET I=(A(R)/360)*100
 420 PRINT AT K,L;B$(R,1 TO );"  ";I;"%" 430 LET K=K+1 440 NEXT R
 445 BEEP .1,30
 450 PRINT AT 21,2;"COPY"
 460 IF INKEY$="" THEN GO TO 460
 470 IF INKEY$="Y" THEN PRINT AT 21,2;"    ": COPY : GO TO 465
 480 PAUSE 100: GO TO 100
```

MARKET SALES 1983-84	
SINC. USER	12%
P. C. W.	25%
P. C. N.	17%
SINC PROGS	18%
COMP TODAY	13%
16-48 TAPE	15%

Pie charts

by D Heron

Book Ends

Book *Puffin Dictionary of Computer Words* **Price** £1.95 **Supplier** Puffin Books

It is a matter of fact that professionals in any field will inevitably invent special terms and a short-hand language of their own, for use in their work. To an outsider, the use of such jargon and slang words can be very confusing, and the world of computing is no exception. To the average person, Ram is nothing more than a sheep and such words as glitch, kludge, Lifo, Logo and Gigo sound positively alien. Puffin have therefore written a very concise, easy to follow and well priced guide to the jargon of computer technology.

Primarily it is a layman's guide aimed at beginners to the field, although people who use computers regularly may find much of the background information interesting. The book contains more than 400 entries, and is written and illustrated in a very attractive, interesting and entertaining way. The real joy of this book is that you don't need any special background knowledge of computers to use it. Anyone from nine to 90 can read it and learn from it.

John Minson

Book *Dynamic Games for the Amstrad* **Price** £5.95 **Micro** Amstrad CPC 464 **Supplier** Interface Publications, 8 11 Kensington High Street, London W8 5NP

A book that goes totally against the grain in terms of all that I hold dear, being totally boring and uninteresting in terms of basic concept. On the other hand *Dynamic Games for the Amstrad* doesn't have that much competition as yet, so undoubtedly it's of some interest to Amstrad owners.

The book is a collection of games listings of various kinds, there are mental puzzles, short adventures, simulations, etc. Each is preceded by just enough text to explain what the game does — there is no real attempt at annotating the listings.

If you want a book consisting entirely of listings for games, most of which you will play only once or twice then this is the one for you. It is undoubtedly no worse than the ones which will follow it.

Graham Taylor

Book The Spectrum Operating System **Price** £5.95 **Micro** Spectrum **Supplier** Micro Press, Castle House, 27 London Road, Tunbridge Wells, Kent

Don't reinvent the wheel. That's the tacit advice of this book which details the functioning of the Spectrum Operating System. Understanding the system is important for reasons other than pure academic education. Many basic machine code routines, common to all kinds of programs can be performed with your writing new versions.

This book by Steve Kramer is hardly the light reading that 5 000 exciting Arcade Games for the Spectrum type books are and you really will need to have dunked more than a toe into the deep and murky waters that is machine code programming to get anywhere with it. However, if you're already knocking out goodish machine code games the important information this book contains could be very useful.

The book does not merely explain what each routine does and where they are located in memory, but contains detailed information about what elements of the routine may, and may not, be played around with. For example in some routines apparently innocent mutations will play havoc with the stack pointers causing well...best not to talk about it.

Detailed and useful information backed up with numerous appendices and comprehensive (and vital) index — a good buy for initiates.

John Minson



Another winner in The Hobbit class It's a complex real time adventure which will keep devotees puzzled for hours ' DAILY EXPRESS
'Sophisticated, rich in atmosphere and amazingly detailed, Sherlock is a game which no Spectrum owner will want to be without ' MICRO ADVENTURER
Sherlock is a long way ahead of the rest of the competition ' PERSONAL COMPUTER NEWS
'In Sherlock you can not only talk to other characters, of whom there are at least thirteen, and ask them to do things for you but you can also interrogate them and even discuss the case '
'Sherlock Holmes has been well worth waiting for with an 800 word vocabulary, real Victorian transport system - cabs and trains and all and a cast of characters peopling screens of graphics designed by Mugsy man Russell Comte '
An intriguing and absorbing game
I have been totally enthralled with this new brilliant adventure I thought The Hobbit was good, but the added vocabulary and the even more intelligent characters, makes Sherlock number one in my software collection '
MR ROGERS BATH
'Sherlock must be the most complex adventure ever created
The creation of atmosphere is superb (more like that of a novel, than a computer game) in fact playing the adventure feels more like acting than playing a computer adventure
The characters in Sherlock behave just as they would in real life and have a very human feel to them, not only in the way they react to situations but also in their displaying of human emotions '
Rich mental imagery
'Sherlock is an adventure which has yet to be beaten
Sherlock is a superb program and will provide many hours (hours? months more likely) of stimulating entertainment
Sherlock is an excellent adventure bursting with atmosphere challenge and inventiveness
'Sherlock the adventure is about as devious as Sherlock Holmes the master sleuth
Available for C64 and Spectrum 48K
Melbourne House
M

HERE'S WHAT YOU'VE SAID.....

"The standard of the programme is far, far better than we were expecting" **ALAN DAIRE.**

"Eureka! is superb. It's marvellous to have computer software of such high standard from Ian Livingstone" **CAROLE SKAIFE.**

"It's taken over my life – I only have three hours sleep a night. I hated adventure games before this but Eureka! is brilliant!" **ANONYMOUS CALLER.**

"Congratulations on producing such an entertaining and stimulating package" **J. GOODENOUGH.**

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Out of guarantee

Mark Kinsman of Worthing, Sussex, writes:

Q Do you know of any company that will buy an out of guarantee 48K Spectrum (issue 3). I do not wish to sell it privately as I need to sell it quickly.

A There are a number of companies that will buy "used computers", however, I am not in a position to recommend any of them, not having dealt with them myself, or having heard of anyone else who has dealt with them.

Personally I would try and sell your machine yourself, either via an advert in your local paper, or in *PCW* Classifieds (which is actually very cheap). You should realise that you will get more money for your machine if you sell privately as you cut out the middle man.

Top of the league

Andrew Bolsover of Sheffield, writes:

Q I own a Spectrum and am trying to create, save and load files to and from tape. Please could you tell me how to go about this? The files I want to create are the number of matches currently played by my favourite football team's players. It's the number I want to be able to save, in order to be able to load the previous total and add to it accordingly. I hope you follow my drift.

A How about this, Andrew?

```
10 DIM S(30):REM array for
matches played — 30 players
 .
 .
 .            REM set up array of
matches played
100 SAVE "matches" DATA S():REM
stores matches played array
110 REM on cassette.
 .
 .            REM prepare for updating
of matches played
200 LOAD "Matches" DATA S():REM
load matches array back
210 REM into the array S, ready for
updating
```

This process of *Save* and *Load Data*, can be used for any type of data (string or numeric) and for any length of array. The only point to remember is that you must have executed a *Dim* statement prior to *Loading* the array, and that the *Dim* statement must be the same as when you *Saved* the array.

Positional control

Paul Haigh of London, writes:

Q I am looking for methods of positional control using a small micro. The machine that I have is a Spectrum, and I was hoping to use this to control a number of stepping motors. I would be grateful if you could tell me who to contact as regards an interface or whether there is a book on this subject that may help me.

A There is a book that should help you with this project. It is called the *Sinclair Database* and was written by Beardsmore et al.

One more thing I think you would also be well advised to look at is the *Spectrum Hardware Manual* published by Melbourne House as it contains a lot of information which will be useful to you.

Stamped issue 3

Paul Shipley of London, writes:

Q I intend buying a second-hand Spectrum. As the issue 3 is the latest version, this is the one I will choose. Is there a big 'issue 3' stamped on the case, and if not, how can I tell the difference between the three issues?

Also, is there a short program or routine I could use which will test the machine and draw attention to any faults?

A Unfortunately the issue 3 does not have anything special stamped on the case. In fact, the only method of telling which version a particular machine is, is the now legendary *Print in 16602* statement. I do not intend to prolong that debate any more ... enough column inches have already been devoted to it.

The main problems that you are likely to get with an ageing Spectrum are Saving and Loading and keys not functioning. So test every key in every mode, and try saving and reloading a program, plus loading and keys not functioning cassette. That will pick up any major faults ... unless of course you out there know different!

Design problem

Dominic McCann of Liverpool, writes:

Q I have now had my Spectrum for three months, and all that time I have wanted to write my own game. I can do the Basic loader with no problems. It is just the picture that bothers me. Firstly I have no idea how to design it, and secondly I don't know how to make the screen scroll in any direction. How do I go about this?

A Designing a screen obviously requires some artistic talent. If like me you are no Van Gogh, then using tracing paper you can copy pieces of existing drawings and transfer them onto squared paper. Print 'N Plotter Products manufacture paper suitable for that purpose which is available from most computer shops.

Your second problem can only be solved by you understanding how the Spectrum display file works, and obtaining, or writing, scroll routines. One good source of such routines is a book that I have mentioned before, *Supercharge Your Spectrum*, published by Melbourne House.

Data transfer

E A Duncan-Dunlop of Bridgend, Mid Glamorgan, writes:

Q How can I network between a QL and an issue 3 Spectrum? What do I type in to the QL? What do I type in to the Spectrum? Are the Baud rates the same? (My QL is the PM version.)

A *PCW* Vol 3, no 34 contained an article, by B Cornhill, on sending QL listings to a ZX printer attached to a Spectrum.

The baud rate used (on both machines) was 600 although the writer did say that this was for no particular reason. While the article did refer to using the Spectrum printer, the principles of data transfer remain the same. Instead of using *Lprint* on the Spectrum, the data passed across could have easily been put onto microdrive, or stored in the Spectrum memory.

Unofficial command

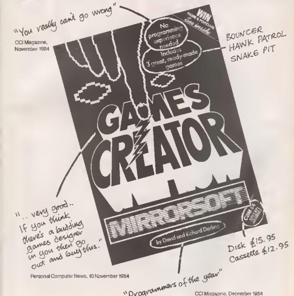
J J Smith of Port Glasgow, Inverclyde, writes:

Q I have a ZX Spectrum 48K and know machine code. Only recently, I discovered that there are assembly language mnemonics which exist that are not in the Spectrum manual. Is there any book which lists these 'unofficial' instructions?

A As you quite rightly point out there are a number of Z80 instructions that are not documented in the Spectrum manual. This is simply because they are not of particular interest to Spectrum machine code programmers. Having said that however, the book that you want (if you are still interested in pursuing your quest) is *Z80 Assembly Language Programming*, written by Lance Leventhal.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, 12-13 Little Newport Street, London WC2R 3LD

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Tony Bridge's Adventure Corner



Drapnir meets Macbeth

I don't often mention *Valhalla* and you probably know by now that it is not one of my favourites. This is not to say, of course, that it is in any way an inferior program — it has sold many thousands of copies becoming one of the major success stories of 1984 and must rate as one of the classics. With Legend's next release *The Great Space Race*, due out soon, it is now about time that I updated the Valhalla Chronicles.

The success in Britain of Legend's program has been repeated across the world, it seems (although, strangely, the program has not met with similar applause in the States). *Valhalla* is obviously doing pretty well in Israel as several people have testified. Jocob Mirador has a problem that seems to be one that foxes most people: *"Now that I'm standing near the chest which contains Drapnir how do I get it? Who do I summon for Help in opening the chest, or who must be present?"*

Actually, the question is often even more basic than this — like the one from Michael Kay: *"I haven't found any of the Quest items. Please give me a clue!"* And this one from P G Hill: *"I have collected all useful objects and visited all the locations I can. I've done everything but still can't find any of the Quest objects. I'm sure that if I can find Ofnir all the rest would unfold. The later objects seem to cause no trouble, but Ofnir and Drapnir seem to present no end of hassles!*

I hope that I can help you get somewhere, Michael. To get Ofnir, go to Krank's Hall where you will almost certainly meet Krank. If you do then you have to remove him, and this will enable you to scoot off to the north west. There you will find a chest containing the object of your first quest. You have to be quick however or else that little thief Klepto will have your treasure away before you can lay your hands on it!

Many of you have written in with this tip, but Iain Gibson, from Hargate in Clydebank, had a particularly interesting follow-up: *"Those of you fed up with waiting to get the Help or Summon commands answered might find the following useful. It's not strictly cheating as it doesn't make the game any easier just a little faster. First, break into the program (this is getting to sound a little like Tony Kendle's column, TB) the best way being to put six objects into a chest. Omit line 6580 to get an immediate response to Help, and line 2005 to get an immediate response to Summon. To restart the program after this type Goto 9800. Felstrong is necessary here, though you will not come across any locations where Felstrong is needed until after the Felstrong quest is completed. Incidentally, Felstrong is much easier to find than many of the other objects, even if your copy does not possess the Felstrong 'Bug', ie, a ringway in Rankle's Hall.*

"It is generally not a good idea to drop quest objects. If for some reason you must get rid of such an object, then give it to a friendly God. In this way, if you need it again, all you have to do is summon that God and ask him nicely to return your goods. Of course, he may refuse.

"Another reason for remaining friendly with the Gods (especially strong ones like Bodir and Thor) is that all the quest objects are in chests or cupboards that are too heavy for you to open, so that you will need to enlist help.

"In general, it is better to carry a sword than an axe, although when you finally get round to searching for Grimnir you will have to keep switching between Skalir and Felstrong. Likewise, a helmet is not much use. I haven't found a location where you must carry a helmet to enter, though there are several where you must not be carrying one.

"An important point to remember, when searching for the later quest objects, is that to enter certain locations you have to satisfy two conditions instead of the usual one. For instance, if you are carrying Skornir, but not Drapnir, you can travel north from Klepto's Hall. This should get you started on Skalir but I think you will find that your Troubles are just beginning.

"Finally, a good map is essential."

Thanks for those tips, Iain — your comments on Lord of Midnights will be mentioned in a couple of weeks time, when I do an update on the program.

Iain's letters arrived over the course of several weeks, during which time he eventually managed to finish the adventure — the same is true of John Rundle, from Aldershot (see last week's *PCW* letters page for John's interesting chess problem.) John will very kindly supply Fact Sheets for *Valhalla, Colossal Cave, Pirate Adventure* and *the Hobbit*. Write to him at 26 Western Road, Aldershot, Hants. (and don't forget the SSAE!)

To find Drapnir, you need to go to the location north from Despair. The way to get there, though is not so simple. First go to the Pits of Hell, and give Ofnir to someone. This tip comes from John Ashcroft, who carries on: *"I always use Snor as he will pay you for it then drop it later for you — and he hardly ever gets killed! Then go east, jump to Hel, summon Help. Then go north, and north again, where you will find a chest."*

I hope these tips will get some of you on the way to fulfilling the Quests.

Before I discuss *Macbeth*, which has just been released, I must declare my interest in the program. The team of seven who created the adventure were given their brief by Sunshine Publications, who are the publishers of this magazine. So you can imagine that I feel rather like a distant cousin to someone who has made a Number One record. I wasn't involved in the development of the program but, even so, I've been watching its progress since its release

Tony Bridge's Adventure Corner

by Creative Sparks with great interest. It has been called by one reviewer in a rival magazine "probably the best adventure of 1984"

The price of £14 95 may seem rather a lot at first glance, but for this you get a nice chunky box, containing two cassettes, and a fat little book This is the complete text of the play, edited from the original 1623 version by two members of the Oxford-based development team. Besides the play, the book also contains commentary on the characters and the play itself — on its own, the book is valuable, with the program, it's sensational! In fact, there are eight programs in all. Four are graphic and text adventures These follow the usual adventure conventions — but the graphics are beautifuly drawn (by another member of the team), and are "dynamic", that is, the picture will change as the player opens doors, takes objects and so on. The four adventures are different in approach, so that the player takes Macbeth's persona in the first and third games, and Lady Macbeth's in the second and last.

Macbeth is one of the bloodiest plays in the English language and it is thrilling to be able to 'take part in the action and dictate it A "strange device in the first part of the program, is the newspaper which gives Macbeth information on the outcome of his battles — a novel but useful invention! With the aid of this, and the text of the play, the player can guide the action along the path he knows it should take After each section, there is a psychoanalytical interlude, during which the player will lie on the analyst's couch and answer questions on his actions You don't have to use these extra programs, but your knowledge of the play will be deepened

There's something here for everyone — the adventures themselves stand up against the best available for the Commodore while the student of the play itself will learn a great deal from the book and programs

Finally, some Help in Colditz the adventure from Phipps. J Houghton writes from Southse "How do I get rid of the Guard in the Tower? I have tried everything I can!"

Well unfortunately for the poor old guard (who's only doing his job, after all), you must *Kill* him with the sharp knife and then grap his uniform — you'll need it later on

Phipps have just released three of their old favourites in a "Super Value Pack It really is super value, too, as for just £7 99 you get *Magic Mountain*, *Greedy Gulch* and, one of my personal favourites, *Knight's Quest* all in one package — it's a steal. The company also tells me that they have recently signed a deal with Les Aventures of Paris, to translate their adventures into French. Apparently this feat has been beyond the powers of normal mortals until now as there are a number of subtle grammatical problems to overcome So, mes amis Bon chance dans votre Quest, et do not blow le garlic dans mon visage!

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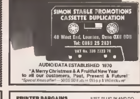
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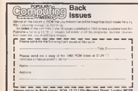
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DANGER MOUSE	6 95	5 21	DARK STAR	7 50	5 61	JET SET WILLY	7 95	5 74			
CYCLONE	6 96	4 96	MATCH POINT	7 95	5 93	FLAK	9 95	7 50	BBC		
POTTY PIDGEON	6 95	4 96	BOULDER DASH	7 95	5 79	WING COMMANDER	7 95	5 96	WHITE KNIGHT MARK II	11 50	8 35
CHALL	6 95	5 21	PSYTRON	7 95	5 93	FORT APOCALYPSE	9 95	7 50	ELITE	14 95	10 90
JASPER	6 95	5 21	TORNADO LOW LEVEL	5 95	4 50	SPITFIRE ACE	9 95	7 50	AVIATOR	14 95	10 64
PYJAMARAMA	6 95	5.21	DEUS EX MACHINA	15 00	11 00	ZAXXON	9 95	7 50	RETURN TO EDEN	9 95	7 36
ALL LEVELS 9 GAMES	9 95	7 36	START BIKE	6 95	5 05	SPIRIT OF THE STONES	14 95	11 25	POLE POSITION	9 95	6 54
PITFALL II	8 99	6 52	KUNG FU	6 95	5 05	STRIP POKER	9 95	7 50	SABRE WOLF	9 95	7.21
KOKO TONI WILF	5 95	4 50	HYPER ACTION	5 95	4 55	BRUCE LEE	9 95	7 50			
BEACH HEAD	7 95	5 90				SUMMER GAMES	14 95	10 94			

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ORIC 1 48K £50!!! with tapes manual mags and 7 software games including Zorgons Revenge, Xenon 1 Harrier Attack, etc vgc. sacbt computer emigrating Tel Kegworth 2217 after 6pm 1 yr old

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COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343

All software offered through computer swap must be in original condition and for private sale only

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SWAP SPECTRUM 48K with keyboard dual joystick interface joysticks, reliable cassette deck currah speech £300 software books worth £50 mags for CBM64 + C2n or Amstrad with + extras sell £250 01-863 5113

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WANTED programmers to convert Spectrum program currently on market to Vic 20 Dragon etc 50% of sales given Write to S Johnson 78 Nairn Street Crookes Sheffield S10 1UN or phone (0742) 681671

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SWAP stereo record player excellent cond for Commodore 1520 printer plotter urgently must be in good cond boxed with instructions if poss Tel Hornchurch 45264 after 7 pm

I WILL swap my C 9 with S W R meter power pack and TW18 for a colour monitor for a Spectrum or accessories Tel Fauldhouse after 4pm weekdays only no 71524

LOOK!! swap my Almes 48K joystick interface software books J V C mini TV radio cassette (cassette compatible) and 16K ZX81 Software books for Amstrad CPC464 genuine reason tel Jerry 531 5488 (01)

ADVENTURE HELPLINE

Fantasia Diamond on Spectrum. How do I get across the river? Tony Slater Flat 3 87 Dunsmure Road, London N16

Ghost Town on Atari. I cannot shoe the horse — I don't have the nails and I can't open the safe with the gunpowder Can anyone help? Chris Oakes, 82 Ashenground Road Haywards Heath West Sussex.

Twin Kingdom Valley on BBC How do I get the master key from the dragon without getting burned to death? H Kulbick, 187 Duncan Road, Aylestone Leicester

Ship of Doom on Spectrum. How do you get the key from under the glass cover in the key room? Martin Parker, 1a Crake Avenue Scartho Grimsby S Humberside

The Castle on Spectrum. How do you get out of the chasm? Donald M Mackay, 2 Stewart Drive, Stornoway Isle of Lewis, Scotland.

Zork's Kingdom on Vic20. I can not get past the pit Mrs C Fuller 83 Hill Grove Salendine Nook Huddersfield, W Yorks

Keys of the Wizard on Dragon. I'm one measure short — I can't open all the chests but I can kill the jester P Hampson, 10 Cherry Lane, Lawton Heath, Alsager Stoke-onTrent Staffs

Hobbit on Spectrum. Where do I go after crossing the last black river in the wooden boat? I can't get beyond the elvish clearing Phillip Shooter, 187 Green Farm Close, Loundsley Green, Chesterfield, Derbyshire

Voodoo Castle on Vic20 How do you go through the crack in the wall? Please help! Geoffrey Beardsell 346 Central Park Road, East Ham, London E6.

Twin Kingdom Valley on Commodore 64. How do you get the master key of the dragon, in the north tower of the Desert Castle? Mark Woolway, 17 Bertram Drive, Meols, Wirral Merseyside

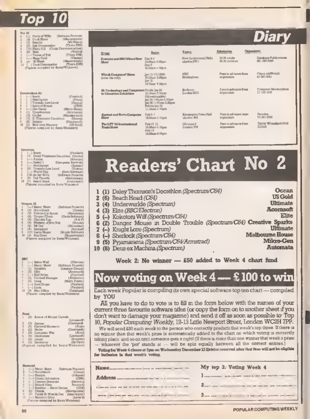
Velnor's Lair on Spectrum. Where are the taps for the bath tub? Chris Taubert, 136 Western Avenue, Dagenham, E Essex.

Hobbit on Spectrum. How do I kill the monstrous dragon once I have got the treasure? M Bird, 36 Ashley Close Pewsey Wilts.

The Hulk on Commodore 64 How do I lift the ring? How do I get the wax? How do I get the big gem? Keith Willis, 2 Leicester Close, Hadrian Lodge, Newcastle-upon-Tyne Wallsend, Tyne-and Wear

Pimania on Spectrum. What is the significance of the red fish? Mark Lambert 3 Mere Farm Grove Oxton Birkenhead.

Mystery of Munroe Manor on Commodore 64 How do I open the wardrobe? F A Taylor 167 Uplands Road, West Moors Wimborne, Dorset



Top 10

Vic 20

1	(1)	Perils of Willy	(Software Projects)
2	(3)	Duck Shoot	(Mastertronic)
3	(2)	Punchy	(Mr Micro)
4	(5)	Sub Commander	(Thorn EMI)
5	(10)	Flight 015	(Craig Communications)
6	(6)	Mist	(Astrog)
7	(—)	Tower of Evil	(Thorn EMI)
8	(—)	Fuse Gold	(Vixen)
9	(4)	3D Maze	(Mastertronic)
10	( )	Tank Commander	(Thorn EMI)

(Figures compiled by Boots/Websters)

Commodore 64

1	(—)	Booty	(Firebird)
2	( )	Matchpoint	(Psion)
3	( )	Tornado Low Level	(Ocean)
4	( )	Spirit of Stones	(CBM)
5	(—)	Jim Genie	(Micro Mega)
6	(1)	Ghostbusters	(Activision)
7	(3)	Chiller	(Mastertronic)
8	(5)	D. Thompsons Decathlon	(Ocean)
9	(6)	Zaxxon	(Centresoft)
10	(2)	Raid over Moscow	(US Gold)

(Figures compiled by Boots/Websters)

Spectrum

1	(—)	Booty	(Firebird)
2	(1)	Daley Thompsons Decathlon	(Ocean)
3	(—)	Avalon	(Hewson)
4	(—)	Select 1	(Computer Records)
5	(—)	Matchpoint	(Sinclair)
6	(8)	Tornado Low Level	(Vortex)
7	(—)	World Cup	(Artic Software)
8	(10)	Jet Set Willy	(Software Projects)
9	(9)	Full Throttle	(Micromega)
10	(4)	Beach Head	(Centresoft)

(Figures compiled by Boots/Websters)

Dragon 32

1	(—)	Manic Miner	(Software Projects)
2	(1)	Hunchback	(Ocean)
3	(2)	Cuthbert in Space	(Microdeal)
4	(8)	Dragon Chess	(Oasis Software)
5	(5)	Chuckie Egg	(A & F)
6	(4)	Mystery of Java Star	(Shards)
7	(6)	Mr Dig	(Microdeal)
8	(8)	Kriegspiel	(Beyond)
9	(10)	Ipsis Magic	(Bright Software)
10	(4)	Bug Diver	(Mastertronic)

(Figures compiled by Boots/Websters)

BBC

1	(—)	Sabre Wulf	(Ultimate)
2	(—)	Manic Miner	(Software Projects)
3	(1)	Scrabble	(Leisure Genius)
4	(3)	Elite	(Acornsoft)
5	(—)	Bird Strike	(Firebird)
6	(2)	Football Manager	(Addictive)
7	(4)	Swag	(Micro Power)
8	(—)	Acid Drops	(Firebird)
9	(—)	Duck	(Firebird)
10	(8)	Mini Office	(Database)

(Figures compiled by Boots/Websters)

Atari

1	(2)	Attack of Mutant Camels	(Llamasoft)
2	(7)	Zaxxon	(Centresoft)
3	(1)	Carnival Massacre	(Atari)
4	(1)	Slinky	(Centresoft)
5	(7)	Computer War	(Atari)
6	(4)	Gridrunner	(Llamasoft)
7	(5)	Loops	(English)
8	(1)	Encounter	(Hi-Tech)

(Figures compiled by Boots/Websters)

Amstrad

1	(—)	Manic Miner	(Software Projects)
2	(—)	Hunchback	(Ocean)
3	(—)	Harrier	(Alligata)
4	(—)	Classic Adventure	(CBM)
5	( )	Fantastic Horrors	(Newsoft)
6	(—)	Roland Ahoy	(Amstrad)
7	(—)	Snooker — Steve Davis	(CDS)
8	(8)	Clouds	(Micropower)
9	(9)	Forest At Worlds End	(Interceptor)
10	(—)	Return to Eden	(Level 9)

(Figures compiled by Boots/Websters)

Diary

Event	Dates	Venue	Admission	Organisers
Electron and BBC Micro User Show	Dec 6-8 10.00am-6.00pm Dec 9 10.00am-4.00pm	New Horticultural Halls London SW1	£2.00 adults £1.00 children	Database Publications 061 456 8383
Which Computer? Show (over 18s only)	Jan 15-17 (1985) 10.00am-6.00pm Jan 18 10.00am-4.00pm	NEC Birmingham	Free in advance from organisers	Clapp and Poliak 01-891 5051
Hi-Technology and Computers in Education Exhibition	Trade: Jan 24 10.00am-1.00pm Educationalists: Jan 24 1.00pm-6.00pm Jan 25 11.00am-6.00pm Public: Jan 26 11.00am-5.00pm	Barbican London EC2	Free in advance from organisers	Computer Marketplace 01-930 1612
Spriant and Sorve Computer Show	Feb 5-7 10.00am-6.00pm	Kensington Town Hall London W8	Free in advance from organisers	Paradox 01-241 2354
The LET '85 International Trade Show	Feb 17-18 10.00am-6.00pm Feb 19 10.00am-4.00pm	Olympia 2 London W8	Free in advance from organisers	Turret Wheatland 0923 777000

Readers' Chart No 2

1	(1)	Daley Thomson's Decathlon *(Spectrum/C64)*	**Ocean**
2	(6)	Beach Head *(C64)*	**US Gold**
3	(4)	Underwurlde *(Spectrum)*	**Ultimate**
4	(3)	Elite *(BBC/Electron)*	**Acornsoft**
5	(–)	Kokotoni Wilf *(Spectrum/C64)*	**Elite**
6	(2)	Danger Mouse in Double Trouble *(Spectrum/C64)*	**Creative Sparks**
7	(–)	Knight Lore *(Spectrum)*	**Ultimate**
8	(–)	Sherlock *(Spectrum/C64)*	**Melbourne House**
9	(5)	Pyjamarama *(Spectrum/C64/Armstrad)*	**Mikro-Gen**
10	(8)	Deus ex Machina *(Spectrum)*	**Automata**

Week 2: No winner — £50 added to Week 4 chart fund

Now voting on Week 4 — £100 to win

Each week Popular is compiling its own special software top ten chart — compiled by YOU

All you have to do to vote is to fill in the form below with the names of your current three favourite software titles (or copy the form on to another sheet if you don't want to damage your magazine) and send it off as soon as possible to: Top 10, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

We will send £50 each week to the person who correctly predicts that week's top three. If there is no winner than that week's prize is automatically added to the chart on which voting is currently taking place and so on until someone gets it right! (If there is more than one winner that week a prize — whatever the 'pot' stands at — will be split equally between all the correct entries.)

Voting for Week 4 closes at 2pm on Wednesday December 12. Entries received after that time will not be eligible for inclusion in that week's voting.

Name...

Address...

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My top 3. Voting Week 4

1...

2...

3...

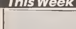
New Releases

HAIL CAESAR

Caesar the Cat was one of the most enchanting programs I've seen (maybe I just like cats) but I later found out that it was basically intended for young children. Oh well. *Caesar's Travels* is definitely for a young market and is obviously intended to be somewhat educational — it's the computer equivalent of bedtime stories

The story begins with Caesar the Cat in his larder trying to rid it of mice (see previous program), failing and being chucked unceremoniously into the yard. From then on you can alter the story by a simple choice of keys at each point For example, in one section you must decide whether to hide in a bin or run away

Depending on the choices you make at each point, a different story is followed. Some end with Caesar in a pretty sorry state, others with him safely tucked away in a warm home. Here and there in the program there are sections where you must answer some simple questions to further the adventure



The graphics are charming with excellent sound effects (Caesar's purr positively glows with pleasure, his plaintive mew is truly heart-tugging). With a wide variety of possible stories the program should last quite a while before it becomes repetitive I think if you have children under ten, they should be transfixed by this one and I might add that I was, too

Program *Caesar's Travels*
Price *£7 95*
Micro *Commodore 64*
Supplier *Mirrorsoft*
Holborn Circus
London EC1P 1DQ

BLACK GOLD

All of Sinclair's recent releases have been educational and many of them have been produced by Macmillan. *Oil Strike* is your big chance to run a multinational company and seek oil.

The main section of the program concerns getting surveys on likely looking areas of rock and trying to deduce from the available visual evidence of rock type and structure whether an oil strike is likely

As you develop more and more strikes, so the world situation develops, boosting or hampering your expansion. You must adjust the rate of production at each oil well in accordance with world market conditions.

The program combines marketing and financial strategy with simple geology as you take risks and try to maximise profits One of those rare educational programs that the pupils should like as much as the teachers

Program *Oil Strike*
Price *£9 95*
Micro *Spectrum*
Supplier *Sinclair Research*
Stanhope Road
Camberley
Surrey GU15 3PS

BUTTERFLIES

Paddington's Garden Game is a machine code collect and dodge whose only distinguishing feature is that it features a main character that looks vaguely like the famous bear. Also, marmalade sandwiches feature somewhere in the plot.

The idea is to move Paddington around a garden collecting butterflies (surely an environmentally unsound act?) and dodging various other objects like hedgehogs and wasps The garden extends to several screens of a fairly simple kind livened up with the occasional pond and fountain.

The sandwich lurks somewhere in the garden and gives Paddington bonus points if he can find it. It's OK and little children who are already Paddington addicts may enjoy it, but honestly, other than the bear it's really nothing special.

Program *Paddington's Garden Game*
Price *£6 95*
Micro *Commodore 64*
Supplier *Collins Soft*
8 Grafton Street
London W1X 3LA

CLEAN UP

Every so often I get programs sent in from readers, most of which are usually dire and are discreetly ignored. But *Litter Bug* from Solsoft is actually pretty good.

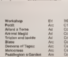
Briefly, the plot is to move a little space creature around a scrolling screen collecting rubbish bags and returning them to an incinerator The screen is full of various sorts of rubbish, some of which is radioactive and must be quickly blasted before it explodes

The graphics are smooth scrolling sprites and the sound is pretty good too, all in all a perfectly good game The only problem is the whole thing looks incredibly like an early Ultimate game, so minus marks for originality Nevertheless, there are worse ways of spending £4 95

Program *Litter Bug*
Price *£4 95*
Micro *Spectrum*
Supplier *Solsoft*
2 Huntly Road
Liverpool L6 3AJ

This Week







Program	*Type*	*Micro*	*Price*	*Supplier*
Number 11	S	Amstrad	£5.50	Camel
Assembler	Ut	Amstrad	£11.50	Amor
Flex Frend	Ut	Amstrad	£7.50	Camel
Grasp	Ut	Amstrad	£6.50	Camel
Toolbox	Ut	Amstrad	£4.99	Camel
Holy Horrors	Ad	BBC	£8.99	Romik
The Land of Chark	Ad	BBC	£4.99	Delta 4
Spooky Manor	Ed	BBC	£6.99	Acornsoft
Workshop	Ed	BBC	£8.95	Acornsoft
Pottit	Arc	C16	£8.99	Romik
Aklard's Tome	Ad	Commodore 64	£6.99	Romik
Animal Magic	Ad	Commodore 64	£6.99	Romik
Tristan and Isolde	Ad	Commodore 64	£8.95	CRL
Blaze	Arc	Commodore 64	£9.95	Romik
Demons of Topaz	Arc	Commodore 64	£5.95	Firebird
Motocross	Arc	Commodore 64	£7.50	System 3
Paddington's Garden	Arc	Commodore 64	£6.95	Collins Soft

New Releases

UNFORTUNATE

Devil's Causeway poses as some sort of arcade game when, in fact, it is closer to being an educational package. You move a little man along a path and every two or three moves are asked to solve various puzzles, remember shapes which are flashed into the screen, play simple arcade games, etc. Unfortunately, not only are some of the games completely random, they are all introduced by people named Sid Shape, Simon Surface. In short alliteration rears its ugly head again.



Some of the puzzles are moderately entertaining for about a minute, but really there is a terrible sense of randomness about the whole thing. In addition, the program is technically lame, written in Basic and would only have some small justification if sold cheap as an educational package. At £6 plus it's just silly.

There's another thing, too. The cover is deeply offensive — the theme of the game is that you are trying to avoid being dragged by the devil into his lair and you 'stay on the path' (allegory, me thinks) by answering the question. The cover depicts a scantily clad girl (obviously morally destitute as she has one shoulder bared) trying to drag a man into hell. Woman, ie, sexual temptation as the devil incarnate. This is sick.

Program *Devil's Causeway*
Price *£6.95*
Micro *BBC*
Supplier *Warlock Software, 66 Upper Richmond Road, London SW15*

HOT STUFF

American software for the Commodore 64 has been coming over for quite a while now. However, some of the epic, disc-based adventure games have remained largely unavailable. Changing all that is Trillium, whose multi-disc adventures based on well known science fiction books are being issued in this country for a massive £19.95. Though that figure includes two discs and booklet.

Since all the games have more or less the same format, I chose *Fahrenheit 451* based on the book by Ray Bradbury to look at. Being based on disc you get much more text than you commonly expect — one of the reasons these games are described as interactive fiction rather than graphic adventures. The graphics are detailed though not awe-inspiring but the text analysis is good — roughly analogous to *Sherlock* with the chance to communicate with different characters.

As an adventure *Fahrenheit 451* is excellent, chock full of mysterious messages and a system of communication via literary quotation that takes a while to get the hang of. The problem lies with the system itself every five moves or less your input requires communication between computer and Commodore disc drive — as everybody knows this can take quite a while and means an irritating wait between moves. You need a lot of patience or a better disc drive.

In addition whilst the program is long, I don't think it is really four sides of disc long — I suspect it could have been reduced in size quite a lot by text compression techniques, etc.

Still, it is a good sophisticated adventure. At £19.95 maybe you should persuade someone else to buy it for you.

Program *Fahrenheit 451*
Price *£19.95*
Micro *Commodore 64*
Supplier *Various retail outlets*

WORTHY

There are now quite a few companies selling programs for £1.99 and there are quite a few programs about the Olympics based on *Track and Field*. These two concepts meet each other in *Olympic Challenge* which is not only an Olympic event type program, but costs £1.99.

The truth is that most £1.99 games are not as good as those costing £6 or £7 and *Olympic Challenge* is no *Daley Thompson's Decathlon*. For one thing the little athelete figure is no more than a stick man making the events look more like schematic diagrams than a cartoon.

However, if you accept the quality of the graphics what you get is still quite a fun version of *Track and Field* with all the usual elements of key bashing, judgement and multi events. If you can't afford the expensive programs, then this is a more than worthy substitute.

Program *Olympic Challenge*
Price *£1.99*
Micro *Spectrum*
Supplier *Century City, 98 High Street, Dudley, West Midlands DY1 1QP*

LAST ORDERS

Tapper is one of those games you'll either find very addictive and funny or completely boring and insane. When the

This Week

Suicide Strike	Arc	Commodore 64	£7.95	System 3
Tapper	Arc	Commodore 64	£9.95	US Gold
Titans	Arc	Commodore 64	£9.95	Romik
Caesar's Travels	Ed	Commodore 64	£7.95	Mirrorsoft
Histeach	Ed	Commodore 64	£9.50	Megatron
Perils of Bear G.	Ed	Commodore 64	£6.95	Cheetahsoft
Rapid Assembly Syst.	Ut	Commodore 64	£14.95	Romik
Demolition Derby	Arc	Dragon	£8.00	Microdeal
Fruity	Arc	Dragon	£4.95	Impsoft
Ice Castles	Arc	Dragon	£8.00	Microdeal
Worlds of Flight	S	Dragon	£8.00	Microdeal
Chess	S	MSX	£8.95	Kuma
Galaxias	Ad	Spectrum	£4.95	Delta 4
3D Starstrike	Arc	Spectrum	£5.95	Real Time
Buggy Blast	Arc	Spectrum	£5.95	Firebird
Litter Bug	Arc	Spectrum	£4.95	Salsoft
Olympic Challenge	Arc	Spectrum	£1.99	Century City
Star Sphere	Ut	Spectrum	£6.95	Eclipse

Key Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

Pick of the week

FROG STEW

Mikro Gen's programs have been getting better and better recently — the graphics have got bigger, the games design have improved markedly The techniques which have improved the arcade games so much have now been introduced to create a graphics adventure with some of the most impressive illustrations yet seen.

The Witches Cauldron not only features excellent graphics, but has an unusual and entertaining plot You have been transformed by the kind of magic that is part of the standard kit in adventure games, into a frog and must transform yourself, stage by stage through virtually every kind of intermediate animal until you arrive back to your human state.

You actually appear on the screen as the animal you currently are, one interesting feature of the plot is that your choices within the adventure are limited by what animal you are There are riddles to be solved in return for help, a nice new character set and intelligent use of colour not only in the graphics, but in the text itself

It's cute rather than macho with a lot of humour, but fiendish enough for all that. It understands pretty complicated sentences and kept me entertained for hours What more do you want?

Program *The Witches Cauldron*
Price *£6.95*
Micro *Spectrum*
Supplier *Mikro-Gen*
44 The Broadway
Bracknell
Berks

blurb says that the game has five separate game screens this is true, but really it is only the same idea represented in different ways — in this respect it is a bit like life or *Finnegans Wake* for that matter

And so the idea on which it all hinges — you are a bartender (the bartender or publican is apparently known as a Tapper in America from whence this program comes — isn't English a funny language?) who must serve a mob of unruly customers, all of whom demand instant service and none of whom pay for their drinks — a bit like our office party actually

Your barman must rush about from customer to customer serving their drinks before they overrun the bar Not only this, but empty glasses are returned by being slid back across the bar top you have to be there to catch them and return a full glass

So it's a running about, dodging back and forth at ever greater speed, keeping your eyes open for customers and glasses type of game, and either that's enough or it isn't

Program *Tapper*
Price *£9.95*
Micro *Commodore 64*
Supplier *US Gold*
Unit 10
Parkway Industrial Centre
Heneage Street
Birmingham B7 4LY

SUPER FUN

In *Demons of Topaz*, the idea is that you are a spaceman and you must collect legendary sacred crystals from the demon guardians The way through the many passages to each crystal is difficult and requires much pondering of pace and jumps — watch out if you fall because your little spaceman will crash to earth with decidedly nasty bump! (Hang on a minute, I seem to have written this before somewhere)

Anyway, it's absolutely fantastic the way you can go through all these screens of action with different problems to be solved on each one (hang on I'm getting confused — what month is this, what year?) Can you figure out how to get from platform to platform and collect the sacred crystals (I keep seeing this mine with penguins and kangeroos and keys you have to collect)

What amazingly exciting fun it all is! Aren't you glad you are in such an innovative, razor's edge of technology-type industry?

Program *Demons of Topaz*
Price *£8.95*
Micro *Commodore 64*
Supplier *Firebird Software*
Wellington House
Upper St Martin's Lane
London WC2H 9DL

ROLLS ROYCE

The Expert Sprite Editor is the Rolls Royce of sprite editors, of which there are many for the Commodore 64

Anything you want for the design of sprites is there, well documented and with all the additional information about using the sprites from Basic you could wish. Expensive but good.

Program *Expert Sprite Editor*
Price *£6.95*
Micro *Commodore 64*
Supplier *Android Dreams*
94 Rednall Road
Kings Norton
Birmingham B38 8DU

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases *Popular Computing Weekly* 12 13 Little Newport Street London WC2R 3LD

This Week

Acornsoft, Betjemen House 104 Hills Rd Cambridge CB2 1LQ **Arnor,** 76 Isham Road London SW16 4TF **CRL,** CRL House, 9 Kings Yard Carpenter s Road London E15 2HD 01 533 2918 **Cheetahsoft,** 24 Ray Street London EC1R 3DJ, 01 833 4909 **Camel,** Wellpark, Willeys Ave Exeter EX2 8BE, 0392 211892 **Century City,** 99 High Street Dudley West Midlands DY1 1QP 0384 57077 **Collins Soft,** 8 Grafton Street London W1X 3LA 01 493 7070 **Delta** 4 The Shieling New Road, Swanmore Hants SO3 9PE, 04893 5800 **Eclipse,** 79 Ardrossen Gardens, Worcester Park Surrey, KT4 7AX 01 330 3116 **Firebird,** Wellington House Upper St Martin s Lane London WC2H 9DL, 01 379 6755 **Impsoft,** 149 Balham Hill, London SW12 01 675 5577 **Kuma,** Kuma Computers 12 Horseshoe Park, Pangbourne RG8 7JW, 07357 4335 **Megatron,** 22 Mountfield Gardens, Kenton Newcastle upon Tyne, NE3 3DB 091 285 1721 **Microdeal,** 41 Truro Road, St Austell, Cornwall PL25 5JE 0726 73456 **Mirrorsoft,** Mirror Group Holborn Circus London EC1P 1DQ, 01 353 0246 **Real Time,** Prospect House 32 Sovereign Street, Leeds LS1 4BJ 0532 458948 **Romik,** 272 Argyll Avenue, Slough SL1 4HE 0753 71635 **Solsoft,** 2 Hurly Road Liverpool L63AJ, **System 3,** 136 Carlton Avenue East Wembley Middlesex **US Gold,** US Gold Unit 10 The Parkway Ind Centre, Heneage Street Birmingham B7 4LY, 021 359 3020

This Week is a new section that covers all the new software coming on to the home micro market each week All suppliers should send details of their new programs to This Week *Popular Computing Weekly* 12-13 Little Newport Street London WC2R 3LD

Ziggurat

Alien logic

For what seems like years I've been listening to software companies discussing the problem of how to find people who pirate tapes — and various suggestions of what to do with them.

From the vast resources of my technical knowledge — gained from 20 years of reading science fiction — I have a suggestion to offer.

An SF novel I recently came across was William Gibson's *Neuromancer* (Gollancz £8.95) parts of which are exciting inside-the-computer network action this sets your adrenals tingling at 1200 baud. A bit like *Tron* in fact, only with a plot which very nearly makes sense. Anyway, not to be sidetracked, one of the hazards of cyber-space piracy in *Neuromancer* is the dreaded black ice. ICE in the book stands for Intrusion Countermeasures Electronics, the defence systems of a computer installation or even by extension, a program. Black ice is an especially nasty version which (in ways never very clearly explained) does especially nasty things to pirates trying to tinker with the defences and break security. What sort of nasty things? Oh, total cessation of neural activity, brain death, etc.

Of course, as an SF idea this isn't astonishingly new. Fred Hoyle's *The Black Cloud* (1957) and Piers Anthony's *Macroscope* (1969) both introduce the notion of killer information. Listen to the awesome message from the stars and you quietly go bananas because the human brain can't cope with the intricate alien logic-chains.

So how, ask the software people, could this be put into practice in the real world of computing? After all, if there are algorithms which can unlock your mind and scramble the contents they're probably jealously guarded trade secrets of the Pentagon and the Kremlin. Or the Ministry of Defence which is well known for slapping SECRET classifications on to software protection systems which actually seem to work.

On the ordinary commercial scale I see it working something like this. Professor Moriarty, a criminal of deepest dye and one of the most evil men ever to walk this earth, wants to make a furtive and illicit copy of *PiManic Kongfrogger Llamattack* for his own vile purposes. The first step of his monstrous plot is to break into the program ... but the defences, the machine-coded walls of ICE, are ready for him.

At the first break in attempt the program hits back. First the screen begins to flicker at a certain strobe frequency tuned to the rhythms of the optic nerve. This can cause epilepsy and softens up the miscreant for the appalling sub-sonic vibrations which drone from the micro's speaker at those special low frequencies which stir the guts and fill people with panic and nausea. (Spectrum owners get off lightly here since its sound oscillator isn't too good at even quite ordinary frequencies.) Swirling convergent, hypnotic patterns follow which fill the screen, sucking in the gaze of the user, producing a deepening hypnotic trance (unless of course the high res graphics aren't too hot) until the screen, flashing on and off too swiftly for the eye to read, conveys a subliminal message straight into the deepest levels of the unconscious mind instilling firm commands: *Set fire to your tape-copying software. Kick your cassette unit violently across the room. Throw your computer on the floor and jump up and down on it. You MUST obey. You cannot resist.*

Do you think it could work? The technical details of all this would, of course, have to be left to the software people to sort out.

I fully expect that as the technique is developed further along William Gibson's lines, the twitching, brain-scrambled bodies of failed software pirates will become commonplace.

There's only one small remaining worry. Recently I was using an assembler which (like so many assemblers) takes several hundred years to load from tape, isn't available on disc, and crashes if you so much as breathe in the same room. One wrong keystroke at the menu level (let alone when actually trying to run machine-code) can make the whole thing seize up. I know this because I hit a cursor key by mistake and the program had a fit. Furious bashing at the *Break* key produced a mysterious pause and then, before I was dumped back into Basic, the message *Copying tapes is illegal* appeared.

I spent several hours hating and cursing whoever wrote that program.

I haven't dared since even to pick up William Gibson's book, just in case ...

David Langford

Puzzle

Locked out

Puzzle No 135

Simon Scatterbrayne has chained his bicycle to the railings outside the Dog and Puddle and now finds that he has forgotten the 3-digit combination this opens the lock.

"I know that the number divided by the sum of its digits is equal to my age (in years)," he said hopefully to Dr Dimwitz, who happened to be passing.

Fortunately, the doctor was pretty good at lightning calculations, and had soon narrowed it down to six possible values.

"I know exactly which one it is," exclaimed Simon, "You see, I have just recalled what the 'tens' digit is."

Now the doctor had the advantage of knowing Master Scatterbrayne's age. We don't, but can you determine what the combination was — and Simon's age?

Solution to Puzzle 131

325 blocks can form a triangle of 25 tiers, and squares of 18 x 18 and 1 x 1, 17 x 17 and 6 x 6, or 15 x 15 and 10 x 10.

The program generates successive triangular numbers by summing consecutive integers, each total being tested to see if it can be broken into component square pairs. The first answer that gives three alternative sets of squares is the solution.

```
10 LET T = 0 20 LET ROW = 1 30 LET T = T +
ROW 40 FOR F = 1 TO SQR(T) 50 LET S = T - (F
* F) 60 LET SQ = SQR(S) 70 LET SQ =
VAL(STR$(SQ)) 80 IF SQ > F AND SQ = INT(SQ)
THEN PRINT "T" T "ROWS",ROW "SQRS",F,"
"&";SQ 90 NEXT F 100 ROW = ROW + 1 110
GOTO 30
```

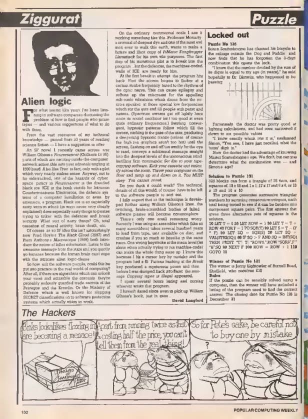
Winner of Puzzle No 131

The winner is Jenny Lightowler of Burnell Road, Sheffield, who receives £10

Rules

If the puzzle can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer. The closing date for Puzzle No 135 is December 31

The Hackers




A Wally Merry Christmas
Christmas Twin Pack with Christmas Card
Spectrum 48K Pyjamarama Automania £11.95
Commodore 64 Pyjamarama Automania £12.95
Amstrad CPC 464 Pyjamarama Master Chess £12.95
MIKRO-GEN


AHEM LADIES AND GENTLEMEN, BEFORE WE CONTINUE WITH THIS WEEKS CARTOON, I'D JUST LIKE TO BID THANKS, ON BEHALF OF MY PALS AT AUTOMATA, TO ALL THE EXHIBITORS AND VISITORS AT THE LAST ALLY PALLY ZX MICROFAIR, WHOSE KIND DONATIONS TO THE ETHIOPIA DISASTER FUND TOTALLED £218- THANK YOU
NOW ZE KARTUNE
THE GANG HAVE PASSED THROUGH THE GATES INTO PILAND WHERE THEY MUST SORT OUT THEIR TAX
WELL, D YOU KNOW ANY GOOD HOTELS?
YEAH A MATE OF MINE WORKS AT THE SAVELOY
HE'LL LET US HAVE A ROOM OR TWO FOR A FREE COPY OF DARTZ
WOTCHIT PIMAN - THA'S ADVERTISIN' WOT EVER NEXT?
WELL? DID YOU FIX US UP?
NO! HE'S LEFT! SOME PI IN A FUNNY COSTUME WAS THERE LET'S TRY THE PILTON!
SORRY FULLVS UPPUS!
NONSENSE! YOU MUST HAVE SOME SPACE HERE!
NOTE. SORRY PACTUS TITUS!
LISTEN, SLOB. IF YOU DON'T FIND US A ROOM, WE'RE ALL GONNA DOSS IN YOUR LOBBY FOREVER!
WELL - PERHAPS THERE IS A SPACE
GREAT! SQUATED TWIXT A FORD ESCORT AND A CHARIOT IN THE HOTEL MULTISTOREY CAR PARK
WHAT ARE ALL THESE ROMAN LIMEN DOING HERE, ANYWAY?
KEEPING THE LOCALS OCCUPIED!
HEY I KNOW A SPIRITUAL SONG ABOW SHARIOTS
SWING LOW SWEET CHA-
POW
I MUST DO MY LAUNDRY I DIDN'T BRING A CHANGE OF PILLOW CASE. WHO ELSE IS COMING?
LET'S ALL GO AN WASH OUR DIRTY LINEN IN PUBLIC!
HERE WE ARE - OH, IT'S BEGINNING TO SNOW!
MUST BE FAIRY SNOW!
SOFTWEAR LAU
GET YOUR AUTOMATA XMAS STOCKING! PIMAN'S GREATEST HITS VOL II. AND THE 1985 CALENDAR - ONLY £4!! ONLY FROM US · AUTOMATA U K LTD, 27, HIGHLAND ROAD, SOUTHSEA, HAMPSHIRE PO4 9DA TEL (0705) 735242 (END OF AD)
OH - NO ROOM AT THE LAUNDERETTE EITHER? YOU BOYS GONNA BE LONG?
AR WE BELONG ON YARNDER ILL! BUD WE GOTTER WASH UWAR SARCKS! WANT ANY SOPE FLAKES?
THANKS BUT MY CHUM RASTAPIMAN IS BRINGIN' SOME
NO MAN, AH SAID AH WAS BREENGIN MAH AERIAL!!
HEY! THERE'S SOMEONE IN THAT MACHINE, GOING ROUND AND ROUND WITH THE SOCKS
NAW! DOAN'T DU THAT!
YEUK! WATER! SOCKS! SUDS, SUDS, SUDS! I'M SURROUNDED BY SILLY SUDS!
E KEP ARN E AD A MESSIJ, SOW WE SHOVED IM INSOIDE!
WELL BEFORE I DELIVER MY MESSAGE
I'LL JUST SAY DON'T GET IN A FLAP DAVID! IT'S ALL PI IN THE SKY!
WHAT'S COMING NEXT? WHAT ARE THOSE GUYS AT AUTOMATA UP TO?
DAVID LAKE PCW
FIND OUT MORE - NEXT WEEK!!!